



ANNUAL REPORT
OF THE
BOARD OF REGENTS
OF THE
SMITHSONIAN INSTITUTION,
SHOWING
THE OPERATIONS, EXPENDITURES, AND CONDITION OF
THE INSTITUTION
FOR THE
YEAR ENDING JUNE 30, 1901.

REPORT
OF THE
U. S. NATIONAL MUSEUM.



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"Of the Report of the Smithsonian Institution, ten thousand copies; one thousand copies for the Senate, two thousand for the House, five thousand for distribution by the Smithsonian Institution, and two thousand for distribution by the National Museum."

REPORT
OF THE
U. S. NATIONAL MUSEUM,
UNDER THE DIRECTION OF
THE SMITHSONIAN INSTITUTION,
FOR
THE YEAR ENDING JUNE 30, 1901.

REPORT OF THE U. S. NATIONAL MUSEUM FOR THE YEAR
ENDING JUNE 30, 1901.

S U B J E C T S .

I. Report of the Assistant Secretary of the Smithsonian Institution,
with Appendices.

II. Papers describing and illustrating Collections in the U. S.
National Museum.

UNITED STATES NATIONAL MUSEUM,
UNDER DIRECTION OF THE SMITHSONIAN INSTITUTION,
Washington, October 1, 1901.

SIR: I have the honor to submit herewith a report upon the present condition of the United States National Museum, and upon the work accomplished in its various departments during the fiscal year ending June 30, 1901.

Very respectfully,

RICHARD RATHBUN,

Assistant Secretary, in Charge of the U. S. National Museum.

MR. S. P. LANGLEY,

Secretary, Smithsonian Institution.

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PART I.

REPORT

UPON THE

CONDITION AND PROGRESS OF THE U. S. NATIONAL MUSEUM
DURING THE YEAR ENDING JUNE 30, 1901.

BY

RICHARD RATHBUN.

ASSISTANT SECRETARY OF THE SMITHSONIAN INSTITUTION, IN CHARGE OF THE
U. S. NATIONAL MUSEUM.

REPORT

UPON

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Assistant Secretary of the Smithsonian Institution, in charge of U. S. National Museum.

GENERAL CONSIDERATIONS.

Through the munificence of James Smithson, an Englishman, the United States came into possession in 1838 of about half a million dollars, to be used "for the increase and diffusion of knowledge among men." The wise counsels that prevailed in interpreting the provisions of this bequest, a large one for that time, led to the employment of a portion of the fund for founding a museum for the nation, universal in its scope and usefulness.

The authority for carrying out this purpose was embodied in the Congressional act of 1846 establishing the Smithsonian Institution, which directed that there be delivered to it, whenever suitable arrangements could be made from time to time for their reception, "all objects of art and of foreign and curious research, and all objects of natural history, plants, and geological and mineralogical specimens belonging to the United States." Provision was also made for the growth of the collections by exchange, donation, or otherwise, and for the arrangement and classification of the specimens in a manner best to facilitate their examination and study. The first Board of Regents, upon which devolved the task of effecting a definite plan of organization for the Institution, expressed its concurrence in this feature in the following resolution, passed in January, 1847:

Resolved, That it is the intention of the act of Congress, and in accordance with the design of Mr. Smithson, as expressed in his will, that one of the principal modes of executing the act and the trust is the accumulation of collections of specimens and objects of natural history and of elegant art, and the gradual formation of a library of valuable works pertaining to all departments of human knowledge, to the end that a copious storehouse of materials of science, literature, and art may be provided, which shall excite and diffuse the love of learning among men, and shall assist the original investigations and efforts of those who may devote themselves to the pursuit of any branch of knowledge.

Thus were taken the initial steps that have resulted in the building up of the National Museum of to-day, the largest branch of the Smithsonian Institution, and already endowed with resources which in extent, variety, and richness are surpassed, if at all, by only a very few of the older museums of the world. The actual nucleus of the Museum, however, was formed a few years earlier by a society first known as the National Institution and afterwards as the National Institute, organized for the avowed purpose of directing the Smithsonian bequest and of engaging in the pursuit of objects in consonance with the terms of that foundation.

One of these objects was the gathering of historical and natural history specimens from both official and private sources, among the former having been the important United States Exploring Expedition around the world, from 1838 to 1842. The museum of the society, which occupied rooms in the Patent Office building, came virtually to be recognized as the proper place for the deposit and care of all Government collections held in Washington. Another important service rendered by the society, as pointed out by Dr. Goode, was in the direction of educating public opinion "to consider the establishment of such an institution worthy of the attention of the Government of the United States." Failing, however, to secure the public recognition at which it aimed, the National Institute became inactive as early as 1846, though it was not until 1861 that it finally passed out of existence. The Government collections in its possession, which were among those covered by the fundamental act of 1846, remained practically in the custody of the Commissioner of Patents up to 1858, when they were turned over to the Smithsonian Institution. Other material directly under the control of the National Institute was retained at the Patent Office until 1862, and a portion of the historical collection until 1883.

At the time of the foundation of the Institution probably not more than one or two universities or learned establishments in America had so large an endowment, and it was apparently the idea of Congress that the fund left by Smithson was ample to meet the needs of the multifarious operations then proposed. These included, besides the custody of the national and other collections confided to its care, whereby the Museum was made an integral part of the Institution, the accumulation and maintenance of a large library, the conduct of scientific investigations, and the dissemination of useful knowledge, for all of which purposes the construction of an adequate building was primarily required and immediately determined upon. In the absence of any stated limitations as to the time when the transfer of the Government collections should take place, the date for accepting the obligation rested with the Regents, who, while confronted with the mandatory language of the law, were still forced to recognize the inadequacy

of the fund at their disposal for the support of so large an undertaking. The cost of the extensive and elaborate building, designed mainly for the accommodation of the Museum and Library, would have drawn heavily upon the principal of the fund, had not a policy of delay prevailed, nine years being allowed to elapse between the laying of the corner stone, in 1846, and the completion of the structure. This delay gave opportunity for influencing a change of sentiment, so that when, in 1857, the necessary arrangement became possible, Congress was prepared to vote means for building cases, for transferring the specimens from the Patent Office, and, to a certain extent, for the care and preservation of the collections. So inadequate, however, were the sums granted that for many years the slender income of the Institution was heavily drawn upon to insure the maintenance of what was then called the Smithsonian Museum, and justly enough, since the building was paid for out of the Smithson fund, and considerable portions of the collections were and still are the actual property of the Institution, through exploration, gift, and purchase, and a number of the officials in charge of the collections were employed at its expense.

While the collections in the custody of the National Institute remained at the Patent Office, as before stated, until 1858, material for a museum was in the meantime being accumulated at the Smithsonian Institution. The first scientific collection to come into its possession, and, in fact, it accompanied the bequest, was the small but valuable mineralogical cabinet of James Smithson, the founder, who was himself a chemist and mineralogist of repute and a Fellow of the Royal Society of London. This collection was unfortunately destroyed by fire in 1865. The personal bent of Professor Baird, who became an assistant secretary of the Institution in 1850, was toward the collection of natural-history specimens for purposes of study. With the approval of Secretary Henry he put into operation plans for accomplishing this object, which, fostered and encouraged, were soon yielding regular and abundant returns. Professor Baird's own vacations were spent in field work. Officers of the Army and Navy and of other branches of the Government service, fishermen, fur traders, private explorers, and such powerful commercial organizations as the Hudson's Bay Company and the Western Union Telegraph Company were enlisted in the cause and rendered valuable assistance. The influence exerted by these beginnings has been lasting and widespread, as shown in the extensive natural-history operations of subsequent national and State surveys, the organization of the United States Fish Commission, and the support given to scientific collecting by many other bureaus of the Government.

The title "National Museum," first recognized by Congress in 1875, came into general use through the display of the Government collections at the Centennial Exhibition at Philadelphia in 1876. This was

the first exposition in this country in which the Government participated, and the first to make known to vast numbers of the people of the United States the existence of national collections at Washington, as well as new methods of installing and exhibiting museum materials, differing radically from the older cabinets of college or local museums which prevailed up to that time. After its close the material brought back belonging to the Government, together with the extensive gifts made to the United States by private persons and foreign governments, forced the erection of a separate building, which brought the name "National Museum" into greater prominence. Since that time Congress has in the main provided for the maintenance of the Museum, but its management remains, by the fundamental act, under the authority of the Regents of the Smithsonian Institution, administered through their Secretary, who is *ex officio* the keeper—a form of government insuring a consistent and uniform policy and a nonpartisan administration of its affairs. The greater part of the Smithsonian building is still used for museum purposes, and the Institution, as well as all the scientific bureaus at Washington, cooperate, both through men and material, in enlarging and caring for the national collections.

With the primary object of preserving the collections in anthropology, biology, and geology obtained by the national surveys, every effort is being made, through exchange, donation, purchase, and the encouragement of exploration, to so increase its possessions that the Museum of the Government may in time contain the fullest possible representation of all branches of science and the arts capable of being illustrated in a material way. The specimens are classified in two series, one comprising the bulk of the material, being arranged for the purposes of scientific research and reference in laboratories and storerooms, to which students are freely admitted; the other, selected with regard to their general educational value and popular interest, and accompanied by descriptive labels, being displayed in glass-covered cases in the public halls. The duplicate specimens not required for exchanges are made up into sets for distribution to schools and colleges throughout the country. Papers descriptive of the collections, both technical and popular, are published for gratuitous circulation to the extent of three or more volumes yearly; and, finally, the Museum has come to be regarded as a sort of bureau of information in respect to all subjects with which it is concerned even in the remotest degree, the correspondence which this involves now constituting one of its heaviest tasks.

The history of the Museum, as pointed out by the late Dr. Goode, may be divided into three epochs, which he characterized as follows:

First, the period from the foundation of the Smithsonian Institution to 1857, during which time specimens were collected solely to serve as materials for research.

No special effort was made to exhibit them to the public or to utilize them, except as a foundation for scientific description and theory.

Second, the period from 1857, when the Institution assumed the custody of the "National Cabinet of Curiosities," to 1876. During this period the Museum became a place of deposit for scientific collections which had already been studied, these collections, so far as convenient, being exhibited to the public and, so far as practicable, made to serve an educational purpose.

Third, the present period (beginning in the year 1876), in which the Museum has undertaken more fully the additional task of gathering collections and exhibiting them on account of their value from an educational standpoint.

During the first period the main object of the Museum was scientific research; in the second, the establishment became a museum of record as well as of research; while in the third period has been added the idea of public education. The three ideas—record, research, and education—cooperative and mutually helpful as they are, are essential to the development of every great museum. The National Museum endeavors to promote them all.

In the same connection, Dr. Goode also defined the scope and objects of the Museum in the following concise manner:

It is a museum of record, in which are preserved the material foundations of an enormous amount of scientific knowledge—the types of numerous past investigations. This is especially the case with those materials that have served as a foundation for the reports upon the resources of the United States.

It is a museum of research, which aims to make its contents serve in the highest degree as a stimulus to inquiry and a foundation for scientific investigation. Research is necessary in order to identify and group the objects in the most philosophical and instructive relations, and its officers are therefore selected for their ability as investigators, as well as for their trustworthiness as custodians.

It is an educational museum, through its policy of illustrating by specimens every kind of natural object and every manifestation of human thought and activity, of displaying descriptive labels adapted to the popular mind, and of distributing its publications and its named series of duplicates.

AS A MUSEUM OF RECORD.

In its function as a museum of record the growth of the National Museum has been unprecedented, due mainly to the rapid exploration and development of a rich and extensive country under the liberal and progressive policy of the Government. From scientific institutions throughout the world, from foreign governments, and from individuals abundant stores of great value have been received, either as gifts or through the medium of exchange of specimens, and a small fund in recent years has permitted of some purchases to supply desiderata.

The principal sources of the collections may be briefly summarized as follows:

1. The explorations carried on more or less directly under the auspices of the Smithsonian Institution, or by the Institution in connection with educational institutions or commercial establishments, and the efforts, since 1850, of its officers and correspondents toward the accumulation of natural history and anthropological material.

2. The United States Exploring Expedition around the world from 1838 to 1842, the North Pacific, or Perry, Exploring Expedition from 1853 to 1856, and many subsequent naval expeditions down to and including the recent operations in the West Indian and Philippine waters.

3. The activities of members of the United States diplomatic and consular service abroad.

4. The Government surveys at home, such as the Pacific Railroad survey, the Mexican and Canadian boundary surveys, and the surveys carried on by the Engineer Corps of the U. S. Army; and the activities of officers of the Signal Corps, and other branches of the Army stationed in remote regions.

5. The explorations of the United States Geological Survey, the United States Fish Commission, the Department of Agriculture, the Bureau of American Ethnology of the Smithsonian Institution, and other scientific branches of the Government.

6. Donations and purchases in connection with the several expositions at home and abroad in which the Museum and Fish Commission have participated, among these having been the Centennial Exhibition at Philadelphia in 1876, the international fisheries exhibitions at Berlin in 1880 and at London in 1883, the New Orleans Cotton Centennial Exposition in 1884 and 1885, the Cincinnati Exposition of 1888, the World's Columbian Exposition at Chicago in 1893, and the expositions at Atlanta in 1895, at Nashville in 1897, and at Omaha in 1898. The returns from the World's Fair in Philadelphia were of greatest extent, comprising, besides the collections displayed by the United States in illustration of the animal and mineral resources, the fisheries, and the ethnology of the native races of the country, valuable gifts from thirty of the foreign governments which participated, as well as the industrial collections of numerous manufacturing and commercial houses of Europe and America.

7. Exchanges with foreign and domestic museums and with individuals.

Immediately preceding the Centennial Exhibition of 1876, when the collections were entirely provided for in the Smithsonian building, the number of entries of specimens in the Museum record books was about 235,000. In 1884, when the additional room afforded by the new building gave opportunity for taking a provisional census of the large accessions received from Philadelphia, and from other sources, the number had grown to 1,471,000. Now, at the close of 1901, it amounts to nearly 5,000,000.

While these figures convey no impression of the bulk of the collections, when it is considered that in 1885 all of the space in both buildings was completely filled, and in fact was so overcrowded that a third building was already being asked of Congress, some conception may be had of the conditions now existing. The storerooms are packed to

their utmost capacity, making it difficult to gain access to the specimens or to provide adequately for their safety. For many years most of the objects received have had to be stored in outside and unsafe structures where they are mainly piled up in the original packing boxes, and where has already accumulated enough material of great intrinsic and scientific value to fill an additional building as large as that now occupied by the main collections.

AS A MUSEUM OF RESEARCH.

In order to permit of their examination and study, as provided in the act of establishment, the collections of the Museum are, to the extent of its accommodations, arranged systematically and in a manner convenient for reference. Access to the reserve or study series, so called, consisting of the main body of the collections and as complete in all the groups as the accessions have made possible, is given to all properly qualified persons engaged in original research. The opportunities thus afforded are widely availed of, the Museum being visited every year by many investigators, some of world-wide distinction, coming from the scientific centers of European and other foreign countries as well as from all parts of the United States. Material is also occasionally sent out to representatives of other institutions having the means of providing for its safekeeping, when required in the working up of special subjects, or for comparison in connection with their own collections.

The custodianship of the collections being the first and most imperative duty devolving upon the scientific staff of the National Museum, its members find comparatively little time during office hours for advancing knowledge, though they are mostly well qualified for such work, being selected with special reference to their ability to identify and classify the specimens under their charge in accordance with the latest researches. As a matter of fact, however, the staff does produce every year a large number of papers descriptive of the collections, which together constitute an important contribution to scientific literature.

Among the honorary officers having their laboratories at the Museum are a number of assistants employed by other scientific bureaus to conduct investigations on material kept here in their charge, and in whose results the Museum shares.

Many collections have, from time to time, been transferred by the Geological Survey, the Fish Commission, the Department of Agriculture, and other branches of the Government to the custody of the Museum in advance of their final working up, in order to provide for their safe storage and to secure the better facilities for study here afforded. Under this arrangement the amount of research work carried on in the Museum building has been greatly increased.

Though having little means to expend for field work, members of

the Museum staff are occasionally given opportunities to participate in the explorations of other Government bureaus or of private expeditions, in connection with which special researches may be carried on, though the chief advantage results from the acquisition of new and valuable material and a knowledge of the conditions under which it occurred.

AS AN EDUCATIONAL MUSEUM.

The educational side of the Museum is intended to consist mainly of an exhibition of all the classes of objects which it represents, so mounted, installed, and labeled as to directly interest and instruct the general public. The principal difficulty incident to the proper installation of such a collection, conceding all the space required, lies in the selection of its parts, so that while enough is displayed to convey the amount of information which it is intended to impart, the visitor shall not be overburdened or confused with details. While this policy is being followed in the National Museum so far as its means permit, the lack of room has always prevented a complete or satisfactory development of the plan, and every succeeding year the conditions in this respect grow worse instead of better through the increased crowding of the halls. The advances in recent years have been chiefly in the methods of display, in the character of individual and group mountings, and in the labeling, in all of which directions exceptional progress has been made.

A year ago it was announced that all of the halls designed for public use were then for the first time permanently open, though none were above addition or improvement, while in some the arrangement was entirely provisional. This was only accomplished by the transfer of large quantities of material to outside storage, but during the past year it has unfortunately been again necessary to shut off one of the most attractive halls in order to furnish increased space for work-rooms.

In this connection it seems appropriate to refer to the work of Dr. Goode, than whom no museum administrator ever had a better understanding of the public needs. He labored earnestly and conscientiously to make this a museum for, as well as of, the people, and the plans now being carried out are, in all their essential features, of his making. While the assistants might be relied upon to arrange and maintain the study series in a manner acceptable to the specialist, the interests of the public always remained in his immediate charge. He was ever occupied in devising ways for so presenting the features of nature and the activities of mankind that by the very force of his surroundings the visitor was bound to receive and carry with him some definite impressions, some new bit of knowledge. Dr. Goode's labors in this field ranged from the planning of the general scheme to the most

minute details of case architecture and fittings. His official connection with nearly all the important expositions of the past quarter of a century and his exhaustive studies of all the principal museums of Europe and the United States gave him exceptional opportunities for observation and experiment. Though a young man when he died, none other had acquired so ripe an experience and none is more worthy of being followed.

An incidental though very popular educational feature of the Museum, having for its purpose the promotion of scientific teaching throughout the country, has been the distribution to schools and colleges of its duplicate specimens, properly identified and labeled, and put up in carefully selected sets. Inadequate means have prevented this measure from being carried out on the scale which the resources of the Museum would admit of, but many hundreds of such sets have already been given away.

Scarcely a year passes that some exposition, either at home or abroad, is not occupying the attention of the Museum, and through this means its existence and aims are brought constantly and prominently before the public. These expositions have of late followed one another so closely and have required so extensive preparations as to interfere greatly with the ordinary work of the Museum, but the practice of introducing new and varied features, of showing a fresh series of objects or improved groupings in connection with each one, insures a substantial gain, as the collections are returned to Washington, besides fulfilling the important function of making museum methods known to the people of the United States and stimulating the growth of museums in many quarters.

Though mainly technical and most useful to the investigator, the publications of the Museum can be classed, in a general way, as belonging to its educational side, being the medium through which the nature and extent of its collections are made known. The Annual Report, first printed as a separate volume of the Smithsonian Report in 1884, and now in its eighteenth volume, consists, besides the administrative part, mainly of semipopular papers on interesting portions of the collections. The Proceedings and Bulletins are almost exclusively technical, the shorter papers being assigned to the former and the larger and more exhaustive works to the latter. Of the Proceedings twenty-two complete volumes have been issued and of the Bulletins fifty numbers.

PRESENT CONDITIONS AND NEEDS.

Attention has repeatedly been called to the inadequacy of the present accommodations for the national collections. The Smithsonian building had become fully occupied some twenty-five years ago, when the large contributions to the Government from exhibitors at the

Philadelphia Centennial Exhibition led to the erection of the Museum building, completed in 1881. By 1885 this structure was also filled, and though numerous efforts have since been made to secure more ample quarters, all have met with failure. In 1888, 1890, and 1892, the Senate voted \$500,000 for a new building, and in 1896, \$250,000, but none of these measures was even considered in the House of Representatives.

There has been no abatement in the number of collections received annually, but, in fact, a general increase from year to year, and a severe task has thus devolved upon the Museum authorities in arranging for their disposition. New specimens have constantly been added to the exhibition halls and storage rooms until both are overcrowded to the extent that in the one the objects, as a rule, can not be properly viewed by visitors, and in the other their classification has become impossible, and they are for the most part practically inaccessible for study. But so extensive have been the accessions that only a part could be disposed of in this manner, and it became necessary, several years ago, to resort to outside storage, which is now provided for in an old wooden shed upon the Mall and in several rented buildings. None of these buildings is of fireproof construction, though they contain collections of great value and in large part not replaceable. They also lack facilities for the classification and arrangement of the specimens, which are packed away in shipping boxes and, for the time, serve no purpose of any kind.

The collections made by the Government surveys, of which the Museum is the legal custodian, can continue to be received and housed, as additional storage buildings may be leased, if necessary, though the further provision of the law to make them at all times available for study and examination can no longer be carried out. The same applies to specimens obtained by purchase or exchange and to such donations as are given without condition. The Museum is, in fact, being resolved into a mere storehouse of material which comes to it mainly without solicitation, and its larger purpose, while never lost sight of, is becoming more and more difficult to maintain. Its reserve or record collections in every branch should be so systematically arranged that any specimens desired for study could immediately be found; the public exhibition should comprise the entire range of Museum subjects, and be installed effectively and without crowding, and there should be ample and well-appointed working quarters, in which all the activities of the establishment could be conveniently carried on.

With the conditions as they now are, it is not to be wondered at that the National Museum lacks that character of support which has done so much for many other museums. Its donations are generally small and relatively unimportant. The possessors of large and valuable

collections will not present them where they can not be at once displayed or well arranged. Such inducements can now rarely be offered here, but many of the larger museums elsewhere owe their principal growth to generous gifts from wealthy patrons of science and the arts. Specific mention could be made of several large collections which their owners would have preferred to place at the national capital, but which have been given to or deposited in other museums, because in Washington they would have to be packed away for an indefinite period, at great risk of injury and destruction.

The amount of floor space occupied by the national collections is very much smaller than would appear to the casual visitor. The two main buildings contain, in fact, only 195,486 square feet, to which the outside buildings, mostly rented, add 43,203 square feet, making a total of 238,689 square feet. The latter are partly occupied by workshops, but are mainly used for the gross storage of specimens, and in no case for exhibition or for the arrangement in classified order of the reserve series.

In London the subjects represented by the United States National Museum are distributed among several museums, such as the British Museum, leaving out the Library, the Victoria and Albert Museum, and the Museum of Practical Geology, which now have an aggregate of 989,388 square feet of floor space, soon to be increased by 400,000 to 500,000 square feet in the new addition to the Victoria and Albert Museum. In Berlin seven of the national museums relating to natural history and the industrial arts possess some 575,000 square feet of area, and the new National History Museum of Vienna has over 350,000 square feet alone. In our own country, the American Museum of Natural History in New York City, which, when completed, will cover a ground area of over $5\frac{1}{2}$ acres, already has 356,800 square feet of floor space available.

A study of the conditions in Washington has shown that to properly arrange the national collections and provide for the growth of perhaps fifteen or twenty years would require additional floor space to the extent of something like 400,000 or 500,000 square feet. If this were obtained through the construction of a new building having that amount of room, it would still be necessary to utilize both of the present buildings, and this seems the preferable course to pursue.

SUMMARY OF THE OPERATIONS OF THE YEAR.

APPROPRIATIONS AND EXPENDITURES.

The total amount appropriated by Congress for the maintenance of the National Museum during the year ending June 30, 1901, was \$263,540, that for the previous year having been \$238,540. The principal changes as compared with 1900 were an increase of \$10,000 for

preservation of collections, an increase of \$9,000 for repairs to buildings, and a separate appropriation of \$10,000 for the purchase of specimens. The appropriation for furniture and fixtures included \$2,500 for furnishing a lecture hall, and that for heating, lighting, and electrical service \$3,500 for beginning the installation of an electric-lighting system.

The expenditures from the appropriations for 1900-1901 amounted to \$246,824.67 up to the close of the year, leaving a balance of \$16,715.33 to meet outstanding liabilities. During the same year \$11,026.06 were disbursed from the balance of \$11,400.81 of the appropriations for 1899-1900 on hand June 30, 1900.

The following tables show the expenditures during the year 1900-1901 under each item of the appropriations for the past two years:

Appropriations and expenditures for the fiscal year ending June 30, 1901.

Object.	Amounts appropriated.	Amounts expended.	Balances on hand June 30, 1901.
Preservation of collections.....	\$180,000.00	\$173,492.08	\$6,507.92
Furniture and fixtures (including \$2,500 for furnishing a lecture room).....	17,500.00	15,403.77	2,096.23
Heating, lighting, and electrical service, and installation of electric-lighting system.....	17,500.00	15,611.91	1,888.09
Books.....	2,000.00	1,141.96	858.04
Postage.....	500.00	500.00	
Building repairs.....	15,000.00	14,115.07	884.93
Rent of workshops.....	4,010.00	4,039.92	.08
Purchase of specimens.....	10,000.00	6,941.44	3,058.56
Printing and binding.....	17,000.00	15,578.52	1,421.48
Total.....	263,540.00	246,824.67	16,715.33

Disbursements during 1901 from the unexpended balances of appropriations for the fiscal year ending June 30, 1900.

Object.	Balances June 30, 1900.	Amounts expended.	Balances June 30, 1901.
Preservation of collections.....	\$9,133.82	\$8,802.43	\$331.39
Furniture and fixtures.....	575.24	563.39	11.85
Heating and lighting.....	561.96	561.94	.02
Books.....	878.72	848.08	30.64
Building repairs.....	251.07	250.22	.85
Total.....	11,400.81	11,026.06	374.75

From the appropriations for the year ending June 30, 1899, disbursements were made under the item for the purchase of books to the amount of \$17.25, leaving a balance of \$7.83; and under the item for the erection of galleries to the amount of \$205.12, leaving a balance of 67 cents. Other balances remaining from the appropriations for the same year, which revert to the surplus fund of the Treasury, are

as follows: Preservation of collections, \$1.53; furniture and fixtures, \$1.35; heating and lighting, 1 cent; building repairs, 91 cents; rent of workshops, \$110.08.

Appropriations for the year ending June 30, 1902.

Preservation of collections	\$180, 000
Furniture and fixtures.....	20, 000
Heating, lighting, and electrical service, including \$5,000 for continuing the installation of an electric-lighting system	23, 000
Purchase and installation of new heating boilers.....	12, 500
Purchase of specimens.....	10, 000
Books, pamphlets, and periodicals.....	2, 000
Postage.....	500
Repairs to buildings.....	15, 000
Construction of two galleries.....	5, 000
Rent of workshops and storage quarters.....	4, 400
Printing and binding	17, 000
Total	289, 400

BUILDINGS.

The principal alterations and repairs to buildings comprised the fitting up of a lecture hall, the strengthening of the roof of the Museum building, the substitution of terrazzo pavement for the last of the old wooden floors in the same building, and the starting of a comprehensive system of electric wiring for the exhibition halls and offices of the Museum building.

The old lecture hall, first established in the north west range and subsequently occupying the west north range, was a few years ago literally crowded out of existence through the encroachment of collections. By the transfer of certain materials and workrooms to outside buildings it has been possible during the past year to restore this important feature, and with the small sum specifically appropriated by Congress the east north range, at the left of the main entrance, has been adapted to the purpose. The walls and ceiling were tastefully painted in shades of green and the windows provided with shutters for darkening the room when the stereopticon is used. The platform, seats, lantern stage, and other furnishings are of the simplest character, and are also removable to permit of installing collections for exhibition at any time. The four large Flemish tapestries depicting scenes in the life of Alexander the Great, deposited in the Museum by Gen. P. H. Sheridan in 1886, are now hung in this room, and it is proposed to add other objects, requiring only wall space for their installation, to complete its decoration.

A number of years ago a small electric plant, including a dynamo and gas engine, was installed to meet the requirements of that time for lighting the storerooms, workrooms, offices, and dark passages.

Proving inadequate for the growing needs of the Museum, it has become necessary to arrange for taking current from one of the electric companies and for enlarging and extending the system of wiring. Under authority of Congress the new installation has been planned on a scale ample for also lighting the exhibition halls in the Museum building, thus providing the possibility for opening them at night, should the requisite means be provided. The work was carried on during the last year under an initial appropriation of \$3,500, since supplemented by one of \$5,000, which should insure its completion before the close of 1902.

The roof of the Museum building, never entirely satisfactory and developing many weak points during recent years, has been repaired and strengthened, under the advice of a competent engineer, to the extent that its character warrants, and it is hoped that it can be made to answer for a few years longer.

Taking advantage of the necessity for replacing the steam boilers in the Museum building, which are now worn out beyond repair, and for the renewal of which an appropriation of \$12,500 was made at the last session of Congress, plans were completed before the end of the year for an entire revision of the heating system. It is proposed to install in the Museum building a battery of two boilers of sufficient power to heat both buildings, as well as the adjacent Museum shops, for which heretofore additional boilers in the Smithsonian building and a furnace in the stable building have been required. By this means it is expected to obtain a better service with greater economy of fuel and labor.

ADDITIONS TO THE COLLECTIONS.

The additions to the collections during the year, received in 1,470 separate lots or accessions, amounted to 178,987 specimens, or about 27,000 less than the previous year. The total number of specimens in the possession of the Museum, as indicated by the records, has thereby been increased to 4,994,672, though the actual number is much greater, for the reason that, while thousands of very small objects are often contained in a single package, it has been customary to estimate the contents of such packages at a small nominal figure.

The decrease in the receipts as compared with 1900 was confined to a few divisions. In most divisions there was an increase, and in some the increase was very marked. The scientific value of the additions was, moreover, especially noteworthy.

The most extensive and important accessions as a whole were derived, as usual, from the bureaus of the Government which are engaged in scientific explorations, chiefly the Geological Survey, the Fish Commission, the Bureau of American Ethnology, and the Bio-

logical Survey, the Division of Entomology and the Division of Plants of the Department of Agriculture. The receipts from private establishments and from individuals, by donation and exchange, were also large and of great value, and through the deposit of objects by their owners many interesting features have been added to the exhibition series. Field investigations by members of the Museum staff, which might be made an important means of building up the collections in directions not otherwise covered, have, from lack of funds, only been possible on a very limited scale. In fact, except for the opportunities occasionally afforded to join with the field parties from other bureaus, the Museum assistants could seldom engage in work of this character. During last year, however, as elsewhere explained, they participated in several such expeditions, which were exceedingly fruitful in results.

While the prominent museums throughout the world have generally the means of adding largely to their collections by purchase, this method of acquiring specimens has always been a very minor resource of the National Museum. For the past year Congress has appropriated \$10,000 for this purpose, and though this sum is altogether too small to be effective, the amounts previously available were even much less. Disbursements are almost entirely limited to the purchase of objects not previously represented, and many important desiderata are thus supplied from year to year, but the requirements in this regard can never be at all adequately satisfied without a considerable increase in the size of the appropriation.

Reference will be made in this connection to only a few of the more important accessions of the year, the subject being fully covered in the reports of the head curators and in Appendix II.

In the Department of Anthropology the total number of specimens received was 31,155, of which 26,644 specimens, or about 85 per cent, belonged to prehistoric archaeology and were mainly derived from two sources. The largest accession, consisting of over 18,000 stone implements from an ancient village site in Columbia County, Ga., was purchased of the collector, Dr. Roland Steiner. The second in size, comprising over 7,000 similar implements and other objects principally from Maryland, the generous gift of Mr. J. D. McGuire, constitutes the most important collection ever made in the Chesapeake region by a single individual. Two other noteworthy additions in the same line were collections of flint implements and rejectage of manufacture, one secured by the head curator, Mr. W. H. Holmes, during an investigation of an ancient quarry site in Union County, Ill., the other, presented by Mr. H. W. Seton-Karr, of London, England, illustrating the quarrying and stone shaping arts of the primitive Egyptians.

While the number of specimens added in the Division of Ethnology

was relatively much smaller, several of the accessions were of unusual interest. Micronesia, Polynesia, and Melanesia were represented by a collection of native implements, costumes, etc., made by Mr. C. H. Townsend and Dr. H. F. Moore, naturalists on the U. S. Fish Commission steamer *Albatross* during the extended cruise of that steamer in 1899-1900. Material illustrating the Pamunary and other Indian tribes of the Upper Purus River and the Bororo Indians of Matto-Grosso, Brazil, was received as the result of explorations by Prof. J. B. Steere, of Ann Arbor, Mich., and from the Rev. William A. Cook, the latter through the favor of Dr. Orville A. Derby, of São Paulo, Brazil. By exchange with the Field Columbian Museum the department came into possession of a share of the great collection made by Dr. Emil Hassler in connection with his important investigations among the various tribes inhabiting the region of the Upper Paraguay River in South America and exhibited by him at the World's Columbian Exposition of 1893. The remaining accessions in ethnology and archaeology, as will be seen by reference to the list, relate to countries all over the world and to many parts of the United States. The Division of History has also been greatly enriched through several donations.

In the Department of Biology the additions numbered 115,767 specimens, of which 78,767 were zoological and 37,000 botanical. The Division of Insects shows the greatest increase in zoology, 37,000 specimens, followed by Marine Invertebrates with 11,889, Mollusks with 10,500, Mammals with 7,976, and Birds with 6,478.

One of the most noteworthy accessions was a large amount of valuable material resulting from recent explorations in the East Indies by Dr. W. L. Abbott, including mammals, birds, reptiles, insects, mollusks, and other groups of marine invertebrates, of which a large proportion of the species represented are probably new to science. The generosity shown by Dr. Abbott in continuing to make the National Museum the depository for the many treasures secured during his extended labors in the little-known regions of the Eastern Tropics is exceedingly gratifying. About 300 mammals, 600 birds, and many birds' eggs and reptiles were the outcome of Dr. E. A. Mearns's work in Florida, while the expedition to Venezuela of Capt. Wirt Robinson, U. S. Army, and Dr. M. W. Lyon, jr., was productive of a large collection of mammals, birds, reptiles, insects, etc., including a valuable series of bats. The extensive collection of mammals made in Southern Europe by Mr. Dane Coolidge comprises what is probably the best series of Italian rodents now contained in any museum in the world. From a collecting trip to Madison County, New York, Mr. G. S. Miller, jr., brought back about 200 mammals.

Among the acquisitions in ornithology were many rare and valuable specimens. The most important single accession was the private collection of Mr. Robert Ridgway, containing about 1,100 North and Central American birds, many in the first plumage and all exceedingly perfect preparations. The most valuable additions to the collection of birds' eggs were received as gifts from Dr. William L. Ralph, who is in charge of the section, but some rarities were also contributed by the Biological Survey of the Department of Agriculture.

The expedition made to the Amazon River, Brazil, by Prof. J. B. Steere, on behalf of the Pan-American Exposition, furnished a large series of characteristic reptiles and fishes. Other noteworthy additions of reptiles were a collection from the Polynesian Islands made by the Fish Commission steamer *Albatross*, and another from St. Kitts, West Indies, presented by Mr. W. H. Alexander, United States weather observer. Among fishes the important accessions were the types of new species and other specimens obtained about Porto Rico by the Fish Commission steamer *Fish Hawk* in 1899, the types of Hawaiian fishes collected by Dr. O. P. Jenkins, of Leland Stanford Junior University, and Mr. T. D. Wood, and a series of Japanese fishes presented by the same university.

Especially prominent among the additions to the Division of Mollusks was a donation from Dr. W. Eastlake, of Tokyo, Japan, comprising about 500 species of Oriental shells, which have heretofore been poorly represented in the National Museum. Over 200 species and 3,000 specimens were received from the collecting trip made to Haiti and Jamaica by Mr. J. B. Henderson, jr., and Mr. C. T. Simpson. Other noteworthy accessions were 225 species of Naiades from South and Central America, and a large series of Australian shells.

In the Division of Insects the number of accessions reached 297, and the important ones among them are so many that they can scarcely be summarized in this connection. Of greatest value was the collection of European Lepidoptera brought together by the late Dr. O. Hofmann and obtained by purchase. It comprises 15,626 specimens and is especially rich in the smaller moths.

The Division of Marine Invertebrates received six important collections from the Fish Commission, namely: The ophiurans of the *Albatross* cruise to the Galapagos Islands and the west coast of Central and South America in 1891, and described by Drs. Lütken and Mortensen; the crustaceans from dredgings and shore collecting on the coast of Japan by the steamer *Albatross* and Dr. H. F. Moore in 1900; the corals from the South Sea expedition of the steamer *Albatross* in 1899-1900, and from Porto Rican waters collected by the steamer *Fish Hawk* in 1899; a large collection of crayfishes from West Virginia; and

the crustaceans and echinoderms collected by the Princeton University Arctic Expedition of 1899. Other accessions which may be mentioned are the types of the Oligochete worms collected by the E. W. Harri-man Alaskan Expedition of 1899, a fine series of the marine and fresh-water crustaceans of Hawaii, presented by Mr. H. W. Henshaw; and the specimens of ocean bottom obtained by the U. S. S. *Nero* in its surveys for cable routes in the Pacific Ocean.

In botany the most prominent accession was the collection of 10,000 specimens of lichens, from various parts of the world, which had belonged to the late Henry Willey, of New Bedford, Massachusetts, a well-known specialist in the group, and which was purchased from his estate. Next in importance by reason of their size were a collection of 5,400 plants made in Oregon by Mr. E. P. Seldon and transferred by the Department of Agriculture, and 1,600 specimens collected in Alabama, Georgia, and Tennessee by Mr. Charles L. Pollard and Mr. William R. Maxon, of the Museum.

In the Department of Geology by far the greater bulk of the accessions was received from the U. S. Geological Survey, the more important contributions from this source comprising a type series of 386 specimens of asphalt and associated rocks from various parts of the United States; a large number of rocks and ores from the Ten Mile district, and Silverton, Pikes Peak, and Cripple Creek quadrangles of Colorado; 375 specimens of Pre-Cambrian marine invertebrate fossils, including material figured and described by Dr. Charles D. Walcott; 2,370 fossils, mainly brachiopods, from the Cambrian, 2,425 from the Ordovician of southern Nevada and near El Paso, Texas, and 114 Silurian and 1,550 Devonian fossils from the Helderbergian and Oriskanian beds of Indian Territory, and the higher Devonian of Colorado and New Mexico. Other noteworthy additions were extensive and valuable collections of Cambrian fossils made by and under the direction of Dr. Walcott in Nova Scotia, Newfoundland, Russia, Norway, and Sweden; the private collection of Mr. F. A. Randall, of Warren, Pennsylvania, comprising upward of 3,600 specimens of Upper Devonian and Lower Carboniferous fossil plants; a remarkably fine slab of the floating crinoid, *Uintacrinus socialis*, the gift of Mr. Frank Springer; a skeleton of the gigantic toothed bird, *Hesperornis regalis*, one of the most complete in existence, and of especial value as throwing new light upon the structure of this somewhat anomalous form; a complete but composite skeleton of the New Zealand *Emeus crassus*; a fairly complete skeleton of an adult female mastodon, unearched at Church, Michigan; an exceptionally fine nugget of native platinum, weighing 444 grams, from the Nijni-Tagilsk district in the Russian Urals and some fine clusters of distorted crystals of native silver, in dendritic and fern-like forms, from the Lake Superior district.

The statistics of accessions for the past and previous years are given in the following tables:

Number of specimens received in 1900-1901, and total number in the several divisions on June 30, 1901.

Division.	Received in 1900-1901.	Total.
Anthropology:		
Ethnology.....	2,887	459,182
Historic Archaeology.....	98	2,087
Prehistoric Archaeology.....	26,614	334,601
Technology.....	195	30,979
Graphic Arts.....	7	7,390
Medicine.....		6,800
Religions.....	3	2,370
History and Biography.....	1,181	39,267
Somatology.....	77	2,393
Ceramics.....	44	4,171
Photography.....	3	1,784
Music.....	16	1,411
Biology:		
Mammals.....	7,976	39,806
Birds.....	6,478	126,431
Birds' Eggs.....	899	63,667
Reptiles and Batrachians.....	1,752	41,988
Fishes.....	2,000	154,501
Mollusks.....	10,500	759,390
Insects.....	37,000	1,370,370
Marine Invertebrates.....	11,889	517,231
Helminthology.....	^a 138	^a 5,091
Comparative Anatomy.....	135	15,768
Plants.....	37,000	473,462
Forestry.....		749
Geology:		
Physical and Chemical Geology.....	2,637	83,330
Mineralogy.....	116	35,266
Invertebrate Paleontology.....	28,577	415,153
Vertebrate Paleontology.....	160	
Paleobotany.....	575	
Total.....	178,987	4,994,672

^a Number of catalogue entries.

NOTE.—It is obviously impossible to make an actual count of the specimens in many of the collections, notably those of the lower invertebrates, where single bottles often contain hundreds of specimens.

The number of entries made in the catalogues of the several divisions was 53,573. In Appendix II will be found a complete list of the accessions of the year.

Accessions received annually since 1880.

Year.	Accession numbers (inclusive).	Number of accessions during the year.
1881.....	9890-11000	1, 111
1882.....	11001-12500	1, 500
1883.....	12501-13900	1, 400
1884.....	13901-15550	1, 650
1885 (January to June).....	15551-16208	658
1886.....	16209-17704	1, 496
1887.....	17705-19350	1, 646
1888.....	19351-20831	1, 481
1889.....	20832-22178	1, 347
1890.....	22179-23340	1, 162
1891.....	23341-24527	1, 187
1892.....	24528-25884	1, 357
1893.....	25885-27150	1, 266
1894.....	27151-28311	1, 161
1895.....	28312-29534	1, 223
1896.....	29535-30833	1, 299
1897.....	30834-32300	1, 467
1898.....	32301-33741	1, 441
1899.....	33742-35238	1, 497
1900.....	35239-36705	1, 467
1901.....	36706-38175	1, 470

EXPLORATIONS.

The limited appropriations given the Museum have never permitted more than a very small amount of field work by the members of its staff, and their efforts in this respect have necessarily been restricted to expeditions undertaken with the object of securing additions to the collections or of further elucidating the materials already in its possession. Most of these explorations have in fact only been rendered possible through cooperation with other scientific bureaus of the Government or with private establishments and individuals. The extent of the field work during the past year was, however, above the average, and its results were of exceeding value.

Mr. W. H. Holmes, under the auspices of the Bureau of American Ethnology, and in company with Dr. W. A. Phillips, of the Field Columbian Museum, made a detailed examination of the extensive and important flint quarries in the vicinity of Mill Creek, Union County, Illinois, where prehistoric implements occur in great abundance. In June, 1901, ethnological investigations were begun in the pueblo country by Dr. Walter Hough, in conjunction with Mr. Peter G. Gates, of Pasadena, California, and chiefly at the latter's expense. The work was to be continued during the entire summer. In preparation primarily for the anthropological exhibit at the Pan-American Exposition, partly at the expense of the Exposition and partly at that of

the Museum, collecting trips were made to Sonora, Mexico, by Mr. W J McGee, of the Bureau of Ethnology; to the Philippine Islands by Col. F. F. Hilder, of the same Bureau; to the Indian tribes on the Upper Purus River, Brazil, by Prof. J. B. Steere, of Ann Arbor, Michigan; to the Bororo Indians, a Tupian tribe dwelling near the headwaters of the Paraguay River, Brazil, by the Rev. William A. Cook, and to British Columbia and Alaska by Lieut. G. T. Emmons, U. S. Navy. Dr. Roland Steiner, of Georgia, continued his investigations of the quarries, workshops, and village sites of his own neighborhood, near and at the mouth of Shoulderbone Creek and on Little Kiokee River, and the large collection made there during the year is now deposited in the Museum.

Through the courtesy of the U. S. Fish Commissioner, Mr. W. H. Ashmead was detailed in the spring of 1901 to accompany an expedition to the Hawaiian Islands, where at the close of the year he was engaged in making extensive entomological collections. Dr. J. E. Benedict was also permitted to join the Fish Commission steamer *Fish Hawk* during an exploration of the fishing banks in the Gulf of Mexico opposite Anclote River, Florida, for the purpose of making preparations of marine invertebrates.

During November and December, 1900, Mr. J. B. Henderson, jr., of Washington, to whom the Museum is indebted for many previous favors, made in the interest of the Division of Mollusks and entirely at his own expense an important collecting trip to the islands of Haiti and Jamaica, lasting about six weeks. He was accompanied by Mr. C. T. Simpson. During the summer of 1900 Mr. M. W. Lyon, jr., participated with Capt. Wirt Robinson, U. S. Army, in an expedition to Venezuela, with the principal object of securing specimens of the mammals and birds of that region, though attention was also given to other groups of animals. For collecting mammals, Mr. Dane Coolidge, by special arrangement, visited Italy, Sicily, and southern France, and Mr. Gerrit S. Miller, jr., spent some time in the neighborhood of Peterboro, New York. Fishes were collected at Key West, Florida, by Mr. Barton A. Bean and Mr. William H. King. The expedition to Cuba for the Pan-American Exposition, begun by Messrs. Palmer and Riley in 1900 and referred to in the last report, was completed early in the year.

The only important botanical field work was conducted in the States of Georgia, Alabama, and Tennessee by Mr. C. L. Pollard and Mr. W. R. Maxon.

Under the Department of Geology, Mr. Frederic A. Lucas and Mr. Alban Stewart visited several localities where mastodon bones had been reported, with the object of securing a skeleton for the Pan-American Exposition. A single fairly preserved one was obtained in a locality in southern Michigan. Mr. Charles Schuchert spent consid-

erable time in collecting fossils in Canada, in the vicinity of Buffalo, New York, in Maryland, and in eastern Pennsylvania, his inquiries being specially directed toward fixing more definitely the line separating the Silurian and Devonian systems in America. Examinations of the Cambrian fossiliferous deposits of Newfoundland, Nova Scotia, Russia, and Sweden were conducted in the interest of the Museum by Dr. Charles D. Walcott, Director of the U. S. Geological Survey, and under his direction by Mr. S. Ward Loper and Mr. M. Schmalensee.

Collecting outfits have been furnished to the following persons who have offered to collect material for the Museum: Commander Frederic Singer, U. S. Navy, light-house inspector, Key West, Florida; Dr. S. P. Craver, Montevideo, Uruguay; Mr. R. T. Young, Boulder, Colorado; Mr. Selwyn Branch, Roseau, Dominica, British West Indies; Dr. E. A. Mearns, U. S. Army, Newport, Rhode Island; Mr. Leon J. Guthrie, United States weather observer, Willemstad, Curaçao; Prof. J. B. Steere, Ann Arbor, Michigan; Mr. Percy W. Shufeldt, Washington, District of Columbia; Mr. Frank E. Read, Newport News, Virginia; Mr. Howard W. North, Culver, Indiana; the Baldwin-Ziegler Polar Expedition; Mr. C. B. Adams, Macon, Georgia; Mr. William C. Peterson, Canaveral, Florida; Mr. M. L. Robb, Manila, Philippine Islands.

DISTRIBUTION AND EXCHANGE OF SPECIMENS.

Ten thousand and sixty-five specimens have been sent out as gifts to educational establishments and in the conduct of exchanges, and 9,683 specimens have been lent for study. The gifts, which have been comparatively few, as little material has been available for the purpose during the year, consisted mainly of marine invertebrates and casts of prehistoric implements. A new series of marine invertebrates and a series illustrating rock weathering and soil formation are in course of preparation.

Appendix III contains a detailed statement of all the distributions. The number of lots sent to each State and foreign country are enumerated in the list below:

State or country.	No.	State or country.	No.
Alabama	1	Iowa	5
Arkansas	1	Kansas	2
California	12	Kentucky	2
Colorado	4	Louisiana	2
Connecticut	11	Maine	2
Delaware	3	Maryland	3
District of Columbia	28	Massachusetts	39
Georgia	1	Michigan	2
Idaho	1	Minnesota	3
Illinois	1	Missouri	7
Indiana	5	Nebraska	1

State or country.	No.	State or country.	No.
New Hampshire.....	4	Foreign countries—Continued.	
New Jersey.....	5	Canada.....	7
New Mexico.....	4	Denmark.....	3
New York.....	51	England.....	7
North Carolina.....	3	France.....	7
Ohio.....	3	Germany.....	5
Pennsylvania.....	21	Holland.....	2
Rhode Island.....	4	India.....	1
Tennessee.....	6	Ireland.....	1
Texas.....	1	Jamaica.....	1
Utah.....	1	Mexico.....	3
Washington.....	2	New Zealand.....	1
Wisconsin.....	11	Norway.....	1
Wyoming.....	1	Spain.....	1
Foreign countries:		Sweden.....	1
Austria.....	3	Switzerland.....	1
Belgium.....	4	Uruguay.....	1

Among the more important exchange returns from foreign establishments were the following: Ethnological objects from the Musée de St. Germain, Seine-et-Oise, France; specimens of *Pseudothelphusa fossor*, from the Zoologisches Institute, Kiel, Germany; fossil plants from the Museum Senckenbergianum, Frankfort-on-the-Main, Germany; ethnological objects from British New Guinea and East Africa, from the Royal Zoological and Anthropological-Ethnographical Museum, Dresden, Germany; Diptera from the Museum für Naturkunde, Berlin, Germany; fossil corals from the Royal Geological Museum, Leiden, Holland; bats from the Zoological Museum, Turin, Italy; birds' skins from the Zoological Museum, University of Upsala, Sweden; mammals from the Musée Zoologique de l'Académie Impériale des Sciences, St. Petersburg, Russia; plants from the Royal Botanical Gardens, Sibpur, India; plants from the Botanic Gardens, Sydney, New South Wales; marine, fresh-water, and land shells from the Australian Museum, Sydney, New South Wales; bats from the National Museum, Montevideo, Uruguay; rocks from the Instituto-Geologico, Mexico, Mexico; plants from the Geological Survey of Canada, Ottawa, Canada.

The following material was obtained through exchange with individuals abroad: Fronds of cultivated varieties of ferns from Mr. C. T. Druery, London, England; specimens of Hemiptera from Mr. W. Kirkaldy, Wimbledon, England; a set of Maundy money, A. D. 1900, the last issued by Queen Victoria, from Mr. Edward Lovett, Croydon, England; foraminifera from the West Indies and Ireland from Mr. B. W. Priest, Bank House, Keeppham, Norfolk, England; specimens of exotic Matillidæ and Formicidæ from Mr. Ernest André, Gray (Haute Saône), France; European ferns from Mr. Edward Rosenstock,

Gotha, Germany; carboniferous brachiopods from Dr. E. Schellwien, Königsberg, Prussia; complete costume of a Tyrolean peasant and other articles from Mr. Carl Wohlgemuth, Bozen, Tyrol, Austria; fragment of meteorite from Dr. F. Berwerth, Vienna, Austria; exotic coleoptera from Mr. G. van Roon, Rotterdam, Holland; mammal skins and skulls from Mr. Paul Narbel, Cour, Lausanne, Switzerland; specimens of *Carduus mülleri* from Dr. I. Comabella, Barcelona, Spain; minerals from Prof. W. C. Brogger, Christiania, Norway; plants from Mr. C. Conzatti, Oaxaca, Mexico; birds' skins from Mr. Eugene Coubeaux, Saskatchewan, Northwest Territory, Canada.

RESEARCHES.

Research work by members of the Museum staff is necessarily subordinated to the care of the collections and the development of its educational features as exemplified in the exhibition halls, leaving them comparatively little time for original investigations. Notwithstanding this fact, however, they have contributed extensively each year toward the advancement of science, as will be seen by reference to the Proceedings, Bulletins, and Annual Reports of the Museum, in which their productions are mainly published. The services of scientific men not connected with the Museum have also been availed of in working up and reporting upon special groups of objects, but as such assistance can rarely be paid for, the results accomplished through this means have been relatively inconsiderable. There is frequent demand for the use of specimens in conducting researches at the various scientific establishments throughout the country, and such requests are always complied with so far as possible. It is insisted, however, that the examinations be made in Washington when practicable, and type specimens or choice objects are only allowed to be taken from the city in exceptional cases and when their safety can be absolutely assured. In its present crowded condition the Museum has very scanty accommodations for visiting students who desire to work upon its collections, though a year never passes without a number being given such facilities as exist, and the addition of commodious laboratories would serve an important purpose in the advancement of research as well as of scientific education in general.

In the Department of Anthropology the head curator, Mr. Holmes, has completed a report based on his own ethnological and archaeological observations in the far West during several years past; he has also nearly finished the manuscript and illustrations for a large work on the ancient pottery of the United States, begun some time ago, and has commenced an exhaustive report on the industries of mining and quarrying among the native tribes. The Curator of Ethnology, Prof. O. T. Mason, has continued his investigations on the basketry tech-

nique of the American Indians, publishing one short paper on the subject. He has also completed a study on American aboriginal harpoons, and has given much time to the ethnology of the Philippine Islands, in this connection having arranged and labeled, primarily for the Pan-American Exposition, the large Philippine collection brought back by the late Col. F. F. Hilder. The range of studies conducted by the Curator of Prehistoric Archaeology, Dr. Thomas Wilson, may be indicated by the papers published or presented by him during the year, which were as follows: "Prehistoric archaeology in America," "A classification of arrow points, spearheads and knives of prehistoric times," "Jade in America," "Criminology," and "Prehistoric trepanation." Dr. Wilson has also made an extensive examination of prehistoric tools and implements in furtherance of the inquiry as to whether prehistoric man was ambidextrous or not.

In Biology the number of investigations under way was especially large. The first volume of Mr. Robert Ridgway's exhaustive work on the birds of North and Central America, mentioned in the last report, was put in type, and the manuscript of the second volume was nearly completed. Some new genera and species of tanagers and orioles were also described by Mr. Ridgway. The preparation of a card catalogue of the genera and species of recent and fossil birds was continued, and three papers on the nomenclature of birds were published by Dr. Charles W. Richmond. The work of completing Bendire's Life Histories of North American Birds, of which two parts were issued a few years ago as Special Bulletins No. 1 and 3, has been taken up by Dr. W. L. Ralph, Honorary Curator of the Section of Birds' Eggs. The researches on mammals by Mr. G. S. Miller, jr., have resulted in twenty published papers, mainly descriptive of new species in the East Indian collection of Dr. W. L. Abbott, and of new European, African, and South American forms. Among them, however, were a revision of the red-back mice of Europe, and a key to the land mammals of eastern North America. Mr. M. W. Lyon, jr., completed a study of the osteology of the Jerboas and jumping mice. The investigations of Dr. L. Stejneger related mainly to the reptiles of Japan, Porto Rico, and Cuba, on which he has papers in course of preparation, the illustrations being already made. Dr. Stejneger also reported on the reptiles collected in Venezuela by Messrs. Robinson and Lyon, and published two papers on the group of birds known as Wheatears. Flightless birds and the osteology of the tile fish and its allies were among the subjects investigated by Mr. F. A. Lucas.

The publications of Mr. William H. Dall comprised synopses of the molluscan families Teliiridae, Cardiidae, and Lucinacea, eleven shorter papers on mollusks, and a report, in conjunction with Mr. Charles T. Simpson, on the mollusks collected in Porto Rican waters by the Fish Commission steamer *Fish Hawk* in 1899. Mr. Simpson continued his

studies on the Naiades, which he is engaged in monographing, and completed three short papers on these fresh-water mussels. The Pacific Pyramidellidæ were the principal subject of the investigations of Mr. Paul Bartsch.

Besides his studies on the crustacean family Galatheidæ, begun some time ago, Dr. James E. Benedict reported on the Anomouran crustaceans of the Fish Commission expedition of 1899 to Porto Rico and published papers descriptive of four new species of the symmetrical Paguridæ, and of the hermit crab *Pagurus bernhardus* and its allies. The work completed by Miss M. J. Rathbun included a synopsis of the Grapsoid crabs of North America, a report on the Decapod and Stomatopod crustaceans collected by the Branner-Agassiz expedition to Brazil, keys to the various groups of North American crabs, a report on the Brachyuran and Macruran crustaceans collected by the Leland Stanford Junior University expedition of 1898-99 to the Galapagos Islands, and a report on the crustaceans of the same groups collected in Porto Rican waters by the Fish Commission expedition of 1899. In reporting upon the Decapod crustaceans obtained by the Harriman Alaskan expedition of 1899, Miss Rathbun has undertaken to prepare a complete review of the Decapods of the west coast of North America based upon all the material from that region now in the Museum. Miss Harriet Richardson, collaborator in the Division of Marine Invertebrates, has reported on the Isopod crustaceans of the Stanford University and the Branner-Agassiz expeditions above mentioned, and has published a key to the Isopods of the east coast of North America.

Of the insects collected on the Harriman Alaskan expedition of 1899, many of the groups were worked up by assistants in the Division of Insects of the Museum, as follows: The Diptera by Mr. Coquillett, the Coleoptera and Psyllidæ by Mr. Schwarz, the Hymenoptera by Mr. Ashmead, the Lepidoptera by Dr. Dyar (with the assistance of several specialists), the Arachnida and Neuroptera by Mr. Banks, the Myriapoda by Professor Cook, and the Odonata by Mr. Currie. Of material collected at the Galapagos Islands by Mr. R. E. Snodgrass, Mr. Banks has reported upon the Arachnida, Mr. Ashmead upon the Hymenoptera, Mr. Coquillett upon the Diptera, Dr. Dyar upon the Lepidoptera, Mr. Currie upon the Odonata, and Mr. Heidemann, of the Department of Agriculture, upon the Hemiptera. Besides the above, Mr. Ashmead has conducted studies upon the Ichneumonidea and Bombidæ in the general collection, has completed a report upon the Hymenoptera Parasitica of the Hawaiian Islands, and has continued his researches upon exotic material from Africa, Siam, Japan, Australia, and New Zealand. Mr. Currie has continued work upon the Myrmeleconidæ, and is preparing a synonymical card catalogue of the North American Neuropteroid insects. Much progress has also been made on catalogues

of Lepidoptera by Dr. Dyar, and of Hymenoptera by Mr. Ashmead. Mr. Caudell has published a synopsis of the hemipterous genus *Sinea* and has identified considerable material in the group Orthoptera. The total number of papers by members of the staff of the Division of Insects issued during the year amounted to 78.

The publications from the Division of Plants included five papers by Mr. F. V. Coville, a monograph of the North American Umbelliferae by Mr. J. N. Rose, in conjunction with Prof. John Coulter, a description of a new *Helianthus* and a series of popular articles on the families of flowering plants by Mr. C. L. Pollard, and a list of the ferns of North America and eight other papers relating to them by Mr. William R. Maxon. Investigations in progress in the same division comprised researches on the flora of Mexico by Mr. Rose, who has in preparation an extensive work on that subject; studies of the violets by Mr. Pollard, and studies of the ferns and their allies by Mr. Maxon.

Under arrangements with specialists connected with other establishments, the collections in several zoological groups were being worked up for the National Museum, as follows: The sertularian and campanularian hydroids by Prof. C. C. Nutting, of Iowa University, whose monograph on the Plumularidæ was recently issued as a special bulletin; the holothurians by Prof. Charles L. Edwards, of Trinity College, Hartford, Conn., and Prof. Hubert Lyman Clark, of Olivet College, Michigan, the former having the Pedata, the latter the Apoda; the parasitic copepod crustaceans by Prof. Charles B. Wilson, of the State Normal School, Westfield, Mass.; the recent corals by Mr. T. Wayland Vaughan, of the U. S. Geological Survey, and the crayfishes by Prof. W. P. Hay, of Howard University, Washington, District of Columbia.

In the Department of Geology the head curator, Dr. Merrill, investigated a series of nepheline-melilite rocks collected by Prof. C. H. Hitchcock in Oahu, Hawaii, and completed a study of the stony meteorite which fell in Felix, Alabama, in 1900. His publications include a paper in conjunction with Dr. H. N. Stokes on a stony meteorite which fell at Allegan, Michigan, in 1899, and a meteorite from Mart, Texas, and a "Guide to the study of the collections in the section of applied geology of the National Museum," printed in the Appendix to the Annual Report for 1899. Mr. Tassin's researches related to the analysis of a damourite from California and the dehydration of the metallic hydrates, with special reference to the hydration of ferric and ferrous sulphates and the dehydration of the resultant hydrates and basic salts. He also completed a handbook on the gem collection of the Museum. Mr. Schuchert has continued his preparation of a monograph on the American fossil starfishes and his studies relative to the zones separating the Upper Silurian and Lower Devonian faunas in America, and he also published a paper on the Helderbergian fossils

occurring near Montreal, Canada. Mr. Lucas has begun upon the text for the volume on Stegosaurus projected by the late Prof. O. C. Marsh, and has given some attention to the study of the mastodons of North America. The following papers by him have also been published: "The lachrymal bone in Pinnipeds;" "The characters and relations of Gallinuloides, a fossil gallinaceous bird from the Green River Shales of Wyoming;" "Description of the skull of *Lepidosteus atrox*;" "A new rhinoceros, *Trigonias osborni*, from the Miocene of South Dakota;" "The pelvic girdle of Zeuglodon, *Basilosaurus cetoides* (Owen);" "A new fossil cyprinoid, *Leuciscus turneri*, from the Miocene of Nevada," and "A new dinosaur, *Stegosaurus marshi*, from the Lower Cretaceous of South Dakota."

The collections in the Museum are constantly referred to by the scientific assistants of the Department of Agriculture, the United States Fish Commission, and the Geological Survey. Among persons otherwise connected who have visited the Museum during the past year for the purpose of study the following may be mentioned: Mr. Ernest Thompson Seton, the well-known artist and writer on natural history subjects, spent some time in an examination of the specimens of American deer, in connection with a contemplated work on the large game of the country. Dr. E. A. Mearns, U. S. Army, continued for a short period his work on the zoology of the Mexican boundary survey, studying the American cats, and also giving some attention to the pocket and white-footed mice. Mr. Outram Bangs, of Boston, brought a large series of birds from Panama, and Mr. Frank M. Chapman, of the American Museum of Natural History, some Peruvian birds, for identification with the aid of Museum specimens. The committee on nomenclature of the American Ornithologists' Union made use, as heretofore, of the excellent facilities afforded by the Division of Birds in determining the status of various newly described species and subspecies of birds.

The collections of the Division of Mollusks were consulted by Prof. L. C. Glenn and Mr. A. P. Martin, of the Maryland geological survey, in connection with their work on the Maryland Tertiary formations, and by Mr. F. N. Balch, of Boston, for the identification of certain arctic shells. In the Division of Insects, investigations were conducted by Dr. A. Fenyès, Prof. W. L. Tower, of Harvard University, Miss M. M. Enteman, of Chicago University, Prof. J. B. Smith, of Rutgers College, Mr. J. A. G. Rehn, of the Philadelphia Academy of Natural Sciences, and Sir Gilbert Carter, of Nassau, Bahamas.

Among those who made use of the botanical collections were Prof. E. L. Greene, of the Catholic University, and Mr. E. L. Morris, of the Western High School, Washington, District of Columbia; Mr. Stewardson Brown and Mr. Joseph Crawford, of the Philadelphia Academy of Natural Sciences; Dr. N. L. Britton, of the New York

Botanical Garden; Prof. E. S. Burgess, of the New York Normal College, and Dr. R. H. True, of Harvard University.

In his work upon the fossil Titanotheres for the United States Geological Survey, Prof. Henry F. Osborn, of the American Museum of Natural History, has utilized the extensive series of remains of this reptilian group contained in the Marsh collection recently transferred to the Museum by the Geological Survey.

In the Department of Anthropology investigations were carried on by Hon. A. D. Tompkins, of the Industrial Commission, relative to the African races, in connection with studies upon the negro population of the Southern States, and by Miss Woolson, of Columbia University, New York, regarding primitive weaving.

The number of loans made to specialists to aid them in researches was quite large. In the field of anthropology much material relating to primitive games was sent to Mr. Stewart Culin, director of the Museum of Science and Art of the University of Pennsylvania; various articles bearing upon Asiatic contact with the west coast of America were supplied to Dr. Franz Boas, of the American Museum of Natural History, New York; and a series of spindle whorls was lent to Mrs. H. Newell Wardle, of the Academy of Natural Sciences, Philadelphia. Among smaller sendings were a Cufic tombstone to Mrs. Alexander McD. Lee, of Frederick, Maryland, and a relief map of Palestine in New Testament times to Mr. F. Burgi, of Rochester, New York.

The principal loans of zoological material were as follows: Twenty-eight specimens of Hutia rats (*Capromys*) to Mr. F. M. Chapman, of the American Museum of Natural History; 35 bats to Mr. James A. G. Rehn, of the Philadelphia Academy of Natural Sciences; 185 skins of chicadees, nuthatches, and creepers to Mr. Francis J. Birtwell, of Albuquerque, New Mexico; 28 skins of *Aegialites* to Dr. Jonathan Dwight, jr., of the American Museum of Natural History; 68 skins of *Macrochamphus* to Mr. Reginald H. Howe, of Brookline, Massachusetts; several specimens of the Chimaera, *Hariotta raleighana*, to Mr. Samuel Garman, of the Museum of Comparative Zoology; the entire collection of New England Amphipod crustaceans to Prof. S. J. Holmes, of the University of Chicago, for use in preparing a report for the U. S. Fish Commission; specimens of Nemerteans from the Pacific coast to Dr. Wesley R. Coe, of Yale University; samples of foraminifera to Prof. B. W. Priest, of Keeppham, England; insects of the group Rhynchota to Prof. E. D. Ball, State Agricultural College of Colorado; specimens of Diptera and Hemiptera to Sir George Hampson, of the British Museum of Natural History; a collection of fleas to Prof. C. F. Baker, of St. Louis, Missouri; insects of various groups to Prof. E. S. G. Titus, of the Colorado State Agricultural College, Prof. J. B. Smith, of Rutgers College, New Jersey, Prof. J. S. Hine, of the Ohio State University, Miss M. M. Enteman, of the University of Chicago,

Prof. E. B. Williamson, of Vanderbilt University, Tennessee, and Mr. H. C. Toll, of Pasadena, California; skeletons of birds to Dr. R. W. Shufeldt; *Leptocephalus* forms of fishes and other material to Prof. C. H. Eigenmann, of Indiana University; a cotype of *Bufo argillaceus* to Dr. Albert Günther, of the British Museum of Natural History; and salamanders of the genus *Spelerpes* to Prof. W. S. Blatchley, of Indianapolis, Indiana.

From the Division of Plants specimens were lent to Mr. B. L. Robinson and Mr. M. N. Fernald, of the Gray Herbarium, Cambridge, Massachusetts; Dr. J. K. Small, Mr. P. A. Rydberg, and Prof. L. M. Underwood, of the New York Botanical Garden; Prof. William Trelease, of the Missouri Botanical Garden, St. Louis; Mr. George E. Davenport, Medford, Massachusetts; Mr. A. A. Eaton, Seabrook, New Hampshire; Mr. A. A. Heller, Lancaster, Pa.; Dr. Charles Mohr, Asheville, North Carolina, and Prof. E. L. Greene, of the Catholic University, Washington, District of Columbia.

The sendings from the Department of Geology included specimens of rocks from the Galapagos Islands to Prof. Alexander Agassiz, of the Museum of Comparative Zoology; sections of rocks from Alaska to Mr. Charles Palache, of Harvard University; volcanic rocks to Mr. H. A. Robinson, of the Peabody Museum of Yale University; 300 specimens of rocks to the Division of Soils of the Department of Agriculture; a series of minerals to the United States Geological Survey, to be used in chemical and physical investigations; Oriskany fossils to Dr. J. M. Clarke, of the New York State Museum, Albany; Carboniferous and Triassic fossils to Prof. James Perrin Smith, of Leland Stanford Junior University, and material relating to the fossil chelonia and fossil horse to Dr. O. P. Hay and Mr. J. W. Gidley, of the American Museum of Natural History.

PROGRESS IN THE INSTALLATION OF THE EXHIBITION COLLECTIONS.

The exhibition halls of the Department of Anthropology are now so completely filled, or rather so overcrowded, as to prevent any further additions except of small objects or as older parts of the collection may be removed to storage. This condition prevails in practically every branch of the department, and is especially embarrassing in respect to that class of objects, of which many are received from time to time, that must be at once provided for in the display cases to insure their safety. The work of the year upon the exhibition series has, therefore, been confined mainly to the rearrangement of material, to the substitution of new and better prepared specimens for less desirable ones, and to perfecting the system of labeling. Owing to the lack

of laboratory space, it has, moreover, been necessary to close the galleries in one court and from time to time to shut off temporarily from public use other parts of the exhibition halls.

The crowding which probably strikes the visitor as most objectionable occurs in the Section of American History, which occupies the hall first entered from the main doorway. While the collections here installed were entirely rearranged during the year and only await the addition of printed labels to put the section in as satisfactory a condition as the circumstances permit, it has been necessary to place the cases so close together as to leave exceedingly narrow passageways between them. A large number of very important historical objects are unfortunately still in storage, and the further development of the collection is hindered by the fact that persons having desirable material which they would gladly donate or loan, will only do so on the assurance that their contributions will be immediately displayed. The use of the wall cases along the sides of this hall would afford some relief, but these are now filled with the very valuable collection of musical instruments, for which no other place is available. The Museum has also a large and noteworthy collection of coins and medals, of which only a small fraction is now on exhibition, and which should soon be made accessible to the public.

The exhibits prepared by the department for the Pan-American Exposition, consisting chiefly of large ethnographical groups of lay figures, will, upon their return to the Museum at the close of the exposition, necessitate the clearing out of at least one of the halls for their reception or the dismantling and storage of the groups, which would be almost equivalent to their destruction.

While the halls assigned to the Department of Biology are mainly filled, some to overflowing, in a few instances the completion of the displays has been delayed awaiting the results of further experiments.

The south east range in the Museum building, allotted to the reptiles and fishes, was repainted and furnished with a new floor of terrazzo pavement. Upright cases have been arranged along the walls for the fishes, and floor cases with sloping tops in the middle space for the reptiles and batrachians. The exhibit consists at present of casts of North American species, with a small alcoholic series of deep-sea fishes, accompanied by colored figures, which it is intended to supplement by collections of South American and Old World species in some preservative fluid. No entirely satisfactory method of representing these groups to the public has yet been found. Painted casts can never be made to look like the animals as they appear in life, and no method of retaining the life colors in specimens preserved in liquids has been discovered. The painting of actual specimens has been tried

in certain European museums with some success, and experiments are now under way here with a view to utilizing this method or devising some other which shall render a display of the lower vertebrates more presentable.

Some progress has been made toward perfecting the collection of game birds, fishes, and large mammal heads now temporarily displayed in the lower stairway hall at the main entrance to the Smithsonian building, the walls of which have been repainted in appropriate colors. It is contemplated to replace the individual mountings, at least among birds, by groups of specimens with accessories representing the species in their native surroundings, and several such groups have already been completed.

The finely mounted specimens of large mammals, prepared for the Pan-American Exposition, will ultimately be added to the collections of this group in the South Museum hall. The only work done directly for this hall was the relabeling of the American carnivora. The exhibition of insects, to which a hall in the Smithsonian building was recently assigned, is still only partially and imperfectly installed, owing to the fact that the working up of certain proposed improvements in the manner of mounting and arranging the specimens has not been completed. It is expected, however, to settle upon some definite plan during the present year, after which little delay should ensue in placing this group in a thoroughly presentable condition.

One of the most interesting installations of the year, so nearly completed as to permit of its being thrown open to the public, was that in the so-called "Children's Room," which occupies the main floor in the south tower of the Smithsonian building. This novel feature is fully described in the Report of the Secretary, and also in that of the Head Curator of Biology, on page 63 of this volume. It was instituted by the Secretary for the benefit of the very young people, their entertainment rather than instruction, as an attractive means of inculcating a love for nature. The room, a small one, is richly painted and decorated in a prevailing tint of green, and has a white mosaic floor with celtic border. The cases, which follow the walls, are framed with light-colored wood, but consist mainly of large panes of plate glass, and are so low that even a small child can see the contents of the upper shelves. The subjects represented are mainly zoological; familiar American birds, common European birds, large birds of prey, interesting water birds, curious birds, brilliantly colored birds, illustrations of protective mimicry among birds and insects, and curious shells, corals, sponges, etc. There are also some minerals and fossils, two aquaria with living fishes, and a number of bird pictures on the walls. The labels are all in simple language and printed in large type. Much remains to be done before the exhibit can be regarded as entirely

complete, but even in its present shape it justifies the ambition of its originator, as testified by its countless number of little visitors.

All of the exhibition halls in geology are open to the public, and, except in the sections of paleobotony and vertebrate paleontology, the collections are well arranged and to a large extent quite fully labeled. With the receipt of new material many changes in and additions to these exhibits will naturally be made from time to time. The sections in arrears are those which have been most recently established and in which, moreover, much preparatory work is necessary.

The cases in the west south range, containing the volcanic, geyser, hot spring, and rock-weathering series, have been repainted and the exhibits rearranged. About two-thirds of the building stone collection in the southwest court has been thoroughly overhauled and cleaned.

Owing to the employment of the preparators in connection with the Pan-American Exposition little progress was made toward increasing the exhibition of vertebrate fossils, though the skeleton of a Plesiosaur and a large and fine skeleton of a Triceratops, received with the Marsh collection, were installed. It is proposed to work out and mount, as rapidly as possible, other specimens from this interesting series of large extinct vertebrates. Of invertebrate fossils specimens to the number of over 3,000 were added to the display series.

Work is in progress on a geological section across the United States from the Atlantic to the Pacific ocean, which is to be made a feature of one of the exhibition halls. It is being drawn on a horizontal scale of 2 miles and a vertical scale of 4,000 feet to the inch.

As practically all the available exhibition space assigned to the Department is now occupied, further development under existing conditions must be mainly along the lines already laid down. The section of practical geology could be strengthened by building up certain special exhibits showing the occurrence and association of the ores of some of the more interesting mining regions, and in the event of the construction of a new building with sufficient space provided for the purpose this section can readily be expanded into a thoroughly comprehensive department of practical geology, for which there has long been an urgent demand.

The growth of the meteorite collection will make it necessary to relegate many specimens to the drawer series in order to accommodate some of the more important recent acquisitions and give a more attractive setting to the exhibit as a whole.

VISITORS.

The number of visitors to the Museum building during the year was 216,556, and to the Smithsonian building 151,563. The attend-

ance during each month of the past year, and during each year since 1880, is shown in the following tables:

Number of visitors during the fiscal year 1900-1901.

Year and month.	Museum building.	Smithsonian building.
1900.		
July	12, 019	8, 509
August	17, 402	10, 665
September	16, 602	10, 943
October	18, 322	10, 620
November	12, 849	10, 270
December	16, 673	13, 278
1901.		
January	11, 756	7, 965
February	12, 901	10, 516
March	48, 280	38, 538
April	23, 784	15, 950
May	13, 840	7, 978
June	12, 128	6, 331
Total	216, 556	151, 563
Approximate daily average on a basis of 313 days in the year	692	484

Number of visitors to the Museum and Smithsonian buildings since the opening of the former in 1881.

Year.	Museum building.	Smithsonian building.
1881	150, 000	100, 000
1882	167, 455	152, 744
1883	202, 188	104, 823
1884 (half year)	97, 661	45, 565
1884-85 <i>a</i>	205, 026	105, 993
1885-86	174, 225	88, 960
1886-87	216, 562	98, 552
1887-88	249, 665	102, 863
1888-89 <i>a</i>	374, 843	149, 618
1889-90	274, 324	120, 894
1890-91	286, 426	111, 669
1891-92	269, 825	114, 817
1892-93 <i>a</i>	319, 930	174, 188
1893-94	195, 748	103, 910
1894-95	201, 744	105, 658
1895-96	180, 505	103, 650
1896-97 <i>a</i>	229, 606	115, 709
1897-98	177, 254	99, 273
1898-99	192, 471	116, 912
1899-1900	225, 440	133, 147
1900-1901 <i>a</i>	216, 556	151, 563
Total	4, 607, 454	2, 400, 508

a Years of Presidential inaugurations.

CORRESPONDENCE.

The Museum correspondence, which has always been very heavy, increases in volume from year to year. Outside of ordinary routine matters, it is occasioned for the most part by requests for information, coming from all parts of the world and relating to a wide range of subjects. Specimens, often in large lots, are transmitted for identification, and questions are submitted in regard to all branches of knowledge falling within the Museum's scope. The requests also have reference to Museum administration, the building up and maintenance of collections, the construction of cases, the installation, labeling, and cataloguing of specimens, and, in fact, no topic connected with a great museum or suggested by its existence escapes notice. In accordance with the time-honored custom of the Smithsonian Institution, every communication made in good faith and appropriate to be considered is fully answered, even though this necessitates incessant demands upon the scientific staff, whose regular duties are quite sufficient to occupy their entire time. The number of lots of specimens determined and reported upon during the year at the request of correspondents was nearly 700.

A considerable proportion of the work of furnishing information is accomplished through the medium of Museum publications, of which more than 30,000 volumes and pamphlets were distributed during the year, about one-third of these having been sent in compliance with special applications.

As the Museum has no facilities for making chemical analyses, requests for work of this kind have to be refused.

PUBLICATIONS.

The publications issued during the year comprised the second volume of the Annual Report for 1897, the Annual Reports for 1898 and 1899, volume 22 of the Proceedings, and part 1 of Special Bulletin No. 4, besides reprints in separate form of a large number of papers from the Reports and Proceedings.

Volume II of the Report for 1897 contains a biographical account of Dr. G. Brown Goode, the late assistant secretary of the Smithsonian Institution in charge of the National Museum, together with reprints of several of his more important papers on museums and on the history of scientific progress in America. It is illustrated with portraits of more than 100 men who have been prominent in the scientific advancement of the country. The appendix to the Report for 1898 consists of a single paper, by the late Prof. E. D. Cope, on the crocodilians, lizards, and snakes of North America, comprising 1,100 pages of text, with 37 full-page plates and 347 text figures. The Report for 1899 contains five scientific papers based upon collections in the Museum.

Volume 22 of the Proceedings includes papers numbered from 1179 to 1205, the "Synopsis of the Naiades," by Mr. Charles T. Simpson, being especially worthy of note.

Part I of Special Bulletin No. 4 is the first of a series of papers on the American Hydroids, by Prof. C. C. Nutting, professor of zoology in the University of Iowa. It treats of the Plumulariidae, is in quarto form, and contains 34 plates. This volume was issued early in the autumn.

Dr. W. L. Ralph has undertaken to continue the extensive work on the Life Histories of North American Birds, begun some years ago by the late Maj. Charles Bendire, U. S. Army, and of which two volumes have been printed as special bulletins. A circular (No. 50) soliciting new and unpublished information on the subject has been prepared and distributed to correspondents.

With the permission of the Secretary of the Smithsonian Institution, twenty-five papers prepared during the year by members of the Museum staff, and based on Museum material, have been printed in publications other than those of the Museum. The titles of these papers will be found in the Bibliography. The authors were Dr. T. H. Bean, Mr. Charles Schuchert, Mr. Gerrit S. Miller, jr., Mr. J. N. Rose, Mr. Charles L. Pollard, and Mr. W. R. Maxon.

The number of publications, including bound volumes and pamphlets, distributed during the year amounted to about 31,000.

In Appendix IV will be found a list of the publications by the members of the Museum staff. In the table given below these papers are classified by subjects. The number of authors represented is 78.

Subject.	Papers by Museum officers.	Papers by other in- vestigators.	Total.
Administration.....	2		2
Archaeology.....	3		3
Biography.....	1		1
Biology.....	3		3
Birds.....	10	26	36
Botany.....	17	2	19
Comparative anatomy.....	1		1
Ethnology.....	5		5
Exploration.....	1		1
Fishes.....	1	4	5
Fossils.....	17	7	24
Geography.....		1	1
Geology.....	3		3
Insects.....	90	36	126
Mammals.....	21		21
Marine invertebrates.....	6	2	8
Mollusks.....	15		15
Religions.....	2		2
Reptiles and batrachians.....	8		8
Total.....	206	78	284

LIBRARY.

During the past year the work of the Museum Library has increased in volume, although, unfortunately, no relief could be afforded either in the way of additional space or of assistance. A considerable portion of the new gallery in the west north, and north west ranges will, when completed, be employed for library purposes, and this makes the greatest possible limit of expansion in the present building. The accessions to the library numbered 12,267 books, pamphlets, and periodicals, of which 4,942 were retained out of the Smithsonian deposit. It is the policy of the Smithsonian Institution in library matters to give its first care to the strengthening of the Smithsonian deposit in the Library of Congress, and many sets heretofore retained in the Museum are now being gradually turned over to that Library. This policy will in the future require an increase in the appropriation for books for the Museum, as otherwise its interests must suffer. It should be said, however, that the service of the Library of Congress is more prompt and efficient than ever before, books being sent to the Museum twice a day, and the Librarian and his assistants have cordially cooperated with the Institution and Museum in supplying their needs.

The Library has had during the year four students in cataloguing and library practice generally, and is glad to afford such facilities as its limited space renders possible.

Twenty-five thousand one hundred and forty-one books were lent; 8,986 periodicals were entered; 262 volumes, 147 parts of periodicals, and 536 pamphlets of the Goode library accessioned, and 4,811 cards added to the authors' catalogue.

PHOTOGRAPHY.

The photographic laboratory, under Mr. T. W. Smillie, has produced more than the usual amount of work, which consisted chiefly in photographing important objects in the collections for use in illustrating the publications of the Museum, and the high standard of excellence demanded for this purpose has been fully maintained. The laboratory is also called upon for reproductions of plans and other drawings in connection with the construction and repair work of the Museum, and much other work of a miscellaneous character. An illustrated catalogue in blue print of the very large series of negatives dating back to the first years of the Museum has been nearly completed. The number of negatives made during the year was 902, of silver prints 1,818, of platinum prints 448, of bromide prints 63, and of blue prints 12,144.

COOPERATION OF THE EXECUTIVE DEPARTMENTS OF THE GOVERNMENT.

Valuable assistance has continued to be received from various departments and bureaus of the Government. Officers of the Army and

Navy stationed in the Philippine Islands and in other of the new possessions have made important contributions, having in some cases been furnished with special outfits to facilitate their work of collecting. Representatives of the Department of State abroad have also been instrumental in securing interesting material. Special acknowledgments are due to the Quartermaster's Department of the Army for many courtesies in connection with the transportation of specimens and outfits to and from distant points. The relations of the Museum to the U. S. Geological Survey, the U. S. Fish Commission, the Biological Survey and the Divisions of Entomology and Botany of the Department of Agriculture, and the Bureau of American Ethnology in regard to collections transmitted are referred to elsewhere.

EXPOSITIONS.

Pan-American Exposition, Buffalo, N. Y.—This exposition opened on May 1, 1901, and will continue until November 1. The Smithsonian Institution and National Museum are represented on the Government board of management by the head curator of biology, Dr. Frederick W. True, with the chief clerk, Mr. W. V. Cox, acting as chief special agent and also as secretary of the board. An account of the collection exhibited by the Museum will be found in the Appendix of this Report.

The participation by the Museum in the expositions held in different parts of the country at such short intervals during recent years has had both its advantages and disadvantages, the former undoubtedly preponderating. Through the allotments from the special appropriations made for these expositions the Museum has been able to secure, indirectly, many important additions to its collections, material which it might otherwise be long in obtaining; the development of its exhibition or educational features has been greatly stimulated; its existence, its objects, and its needs have been made widely known, and, what is no less a part of the functions of a national institution, the formation and growth of museums elsewhere have been promoted. The disadvantages arise chiefly from the haste necessary in preparing the exhibits, which causes serious interference with the regular work of the Museum. The time available for all preparations seldom exceeds a year or a year and a half. The display must, in greater part at least, consist of novelties either as to the objects themselves or the manner of presenting them, as the large expositions draw their attendance from all parts of the country and a repetition of the same exhibit would interest but few. After the drawing up of the plans, the entire work must be pushed forward with the utmost speed, and toward the close often under high pressure, to insure its completion within the specified limit. The collections must be overhauled for desirable specimens, and new ones must be sought through the agency of field expeditions

and dealers. But, most important, the array of material thus assembled, equal in quantity to the entire contents of a museum of no mean proportions, must be suitably prepared, mounted, labeled, and adjusted to the cases they will occupy before shipment to the objective point. Most of the cases require to be specially constructed, and the boxing and final installation take much time. All the classes of labor thus involved demand experience and training as much for their performance as for their direction, qualifications seldom obtainable in the open market. It therefore follows that nearly all of the technical work of preparing for an exposition falls upon the employees of the Museum, and consumes, while such work is in progress, a very large proportion of their time. It is perhaps needless to say that each member of the staff called into this service has performed his share with zeal and enthusiasm, a sufficient explanation of the uniformly successful results attained by the Museum at all of the expositions in which it has participated.

The exhibit for the Pan-American Exposition is especially characterized by an exceptionally high grade of preparators' work. In anthropology it consists mainly of 12 life-sized lay-figure groups of the type tribes of American aborigines and of 16 dwelling group models; and in biology of mounted specimens of the larger American mammals, birds, reptiles, and fishes, well illustrating the latest advances in taxidermy. Conspicuous features in geology are skeletons and restorations of several of the large fossil vertebrates from the West, besides which are collections of minerals, native elements, invertebrate fossils, etc. Nearly all of this material will be utilized in the exhibition halls of the Museum on its return.

Louisiana Purchase Exposition, St. Louis.—An appropriation of \$250,000 was made at the last session of Congress for the erection of a Government building at the Louisiana Purchase Exposition intended to be held in St. Louis in 1904, but no money was then voted for the preparation of an exhibit by the Government.

THE MUSEUM STAFF.

At the beginning of the year the Assistant Secretary was placed in immediate charge of the Museum, the direction of which rests with the Secretary of the Smithsonian Institution, its keeper *ex officio*.

The scientific staff has consisted, besides the three head curators, of 18 curators, 12 assistant curators, 14 custodians, 10 aids, 4 associates, and 2 collaborators, making a total of 63 persons, of whom, however, only about one-half were under salary from the Museum, the remainder serving in a volunteer or honorary capacity, though nearly all of the latter were in the employ of other bureaus of the Government. The principal changes in the staff during the year were as follows:

On September 15, 1900, the Museum lost by death its Honorary

Curator of Graphic Arts, Mr. S. R. Koehler, whose connection with the Institution began in 1887, and who was also for many years the curator of prints in the Boston Museum of Fine Arts.

Dr. W. L. Ralph, Custodian of the Section of Birds' Eggs since the death of Maj. Charles Bendire, U. S. Army, and who has contributed liberally of his time and means toward improving the collections under his charge, has been made the honorary curator of that section. Mr. F. A. Lucas, Curator of Comparative Anatomy, has also been designated Acting Curator of Vertebrate Fossils; Mr. George C. Maynard has been advanced from aid to assistant curator in the Division of Technology. Mr. Peter Fireman has received a temporary appointment as chemical geologist, and Miss Harriet Richardson has been made a collaborator in the Division of Marine Invertebrates.

Mrs. F. Weinheimer, preparator in the Division of Plants, resigned on January 1, 1901, and Mr. Joseph Sessford, long connected with the Museum and for several years past serving as clerk in the Division of Reptiles and Batrachians, died on March 8, 1901.

Dr. Thomas Wilson, Curator of Prehistoric Archaeology, visited Paris during the summer of 1900 as the representative of the Museum to the Congress of Anthropology and Prehistoric Archaeology and the Congress of Americanists, at both of which he presented papers elsewhere referred to in this report. Before the close of the fiscal year Dr. Leonhard Stejneger was appointed to represent the Museum at the International Congress of Zoology, which was to meet at Berlin, Germany, in August, 1901.

A list of the members of the scientific and administrative staffs will be found in Appendix I.

NECROLOGY.

Mr. Sylvester R. Koehler, Honorary Curator of the Division of Graphic Arts in the National Museum, died September 15, 1900. Mr. Koehler was born in Lœpsic, Germany, in 1837, but came to America when he was 12 years of age. In 1868 he entered, as technical manager, the establishment of L. Prang & Co., Boston, where he mastered the processes used in the graphic arts. Gen. Charles G. Loring, Director of the Boston Museum of Fine Arts, states that the knowledge which Mr. Koehler thus gained "was supplemented by an artistic temperament, which showed itself also in his fondness for music, in his love of verse, and his skill, though a moderate one, with the pencil. Years of study, too, had given him an intimate acquaintance with the history of his art and confirmed his judgment. He was an admirable critic of work, both creative and technical. * * * He not only became the ultimate authority in the land of his adoption, but his knowledge and judgment were held in great esteem in the art centers of Europe."

Mr. Koehler was appointed curator of the print department in the

Boston Museum in 1888. One year earlier, in 1887, he became connected with the U. S. National Museum, in which at that time the collection of graphic arts was first formally organized. From a very small beginning this collection grew rapidly under Mr. Koehler's supervision, and as a result of his well directed and persistent effort it now comprises more than 7,000 specimens. Using his own words, he aimed to "represent art as an industry," and to this end he planned to make the exhibit one which should illustrate all of the methods employed in producing pictures by lines and masses, in black or in colors, by hand or with the aid of machinery. His aim has been realized to such an extent that a great many of these processes are adequately illustrated by the tools and materials used, as well as by examples showing successive stages in the various methods from the date of their inception to the present time.

For many years Mr. Koehler was attached to the scientific staff of the National Museum as curator. After his health failed and he was unable to devote as much time to the work as formerly he was made an honorary curator. The value of his services in building up the graphic arts collection can not be overestimated.

In 1894 he delivered a course of nine lectures in the National Museum on "Old and modern methods of engraving." His most important work was published in 1885 and was entitled "Etching." At the time of his death he had in course of preparation a "History of the art of color printing." He contributed many articles to the magazines of America, England, and Germany. Among a large number of other important works mention should be made of his "Catalogue of an exhibition illustrating the technical methods of the reproductive arts from the fifteenth century to the present time, with special reference to the photo-mechanical processes," and a "Catalogue of the engravings, dry points, and etchings of Albert Dürer."

Mr. Ralph Dupuy Lacoe, whose benefactions have so greatly enriched the national collections, was born in Luzerne County, Pa., November 14, 1824. His father, Anthony Desiré Lacoe, came from his birthplace in the vicinity of Havre, France, to Philadelphia in 1792. From there he removed, in 1798, to the Wyoming Valley, where, at Pittston, he died in 1883, at an age of only four days less than 103 years. The mother of R. D. Lacoe was Emelié Magdaléne Dupuy, daughter of Jean François Dupuy, a native of Bordeaux, and Jane Elizabeth Desiré, a member of a Huguenot family of Nantes. For many years Jean François Dupuy resided in Santo Domingo, where, in 1791, after the success of the negro insurrection, he escaped, with the loss of his valuable estate, to the United States. In 1795 he finally settled in Wilkesbarre, where, in 1812, his daughter married Anthony Lacoe.

The subject of this sketch was the youngest of Anthony Lacoe's five

children. In his earlier years he had no educational advantages other than those furnished by the country common schools, supplemented by the home teaching of his talented mother, whose strength of character and refinement were deeply impressed on the son. Before Ralph Dupuy was of age he taught school one or more terms, having among his pupils Bridget Clary, who, in 1860, became his wife. Mrs. Lacoe died in 1872, and Mr. Lacoe at West Pittston, Pa., on February 5, 1901, in his seventy-seventh year. They had four children, of whom two survive.

In his earlier years Lacoe followed the trade of his father, that of carpenter. About 1850 he engaged with his brothers in cutting ties on his grandfather's farm to supply a railway then in construction. The proceeds of this venture were fortunately invested in anthracite coal lands in the vicinity of his home near Pittston, and this was the beginning of his modest wealth. As the coal industry of the region developed, he conducted a real estate business, later becoming prominent as the head of several industrial enterprises, and as bank president. In 1869 and 1870 he served as burgess of the borough of West Pittston.^a

Under too great pressure of business responsibility Lacoe's health gave way about 1865, and the efforts toward its recovery resulted, first, in an amateur interest in natural history collecting, and, later, in a deep and steadfast devotion to the promotion of the vegetable and insect departments of paleontology. While seeking health in Florida, he amused himself by collecting the marine algæ and mollusca along the beach. Under the influence of a strong, innate love of nature he found both pleasure and recuperation in the occupation, and on returning to his home in Pennsylvania he soon transferred his interest to the fossil coal plants to be found at the numerous anthracite mines in the region. It was not long before Lacoe was in touch with J. P. Lesley, the State geologist, and Leo Lesquereux, the distinguished paleobotanist, who was then engaged in the study of the paleozoic plants of the State. The warm friendship between Lacoe and Lesquereux continued until the death of the latter, in 1889.

Although Lacoe never fully regained his health, he frequently remarked that he owed years of his life to the out-of-door recreation which he found in collecting. Gradually, as he became more familiar with the undeveloped status of paleobotany and paleoentomology in this country, he engaged in the task of systematically securing paleozoic plants and fossil insects over broader areas and through a greater stratigraphical range, as well as from many foreign type

^a Further biographical data are given in the excellent memorials by Rev. Horace Edwin Hayden, published in the sixth volume of the Proceedings of the Wyoming Geological and Historical Society, 1901, and in the American Geologist for December, 1901.

localities. He also became interested in the investigations of the floras of the later epochs, and in fossil fishes, crustaceans, and myriapods. His purpose was not merely to accumulate a great collection of fossils. He chose for his task in the service to science to contribute to our knowledge of the plant and animal life of the past by discovering, systematically gathering, and bringing the fossil remains to the hand of the paleontologist. This material, often difficult to obtain and rare, he submitted to the most distinguished specialists in the various departments, and not infrequently he further assisted in the illustration and publication of the results of their investigations. Accordingly, we find most of the specimens in his great collections labeled on the authority of Lesquereux, Dawson, Scudder, Cope, Hall, or Packard.

In 1891 he determined to see his collections safely transferred to a repository where they would be permanently cared for and preserved, while at the same time made available for consultation or study. He first tendered his magnificent collection of paleozoic plants, embracing about 100,000 specimens, with nearly 600 types, to the National Museum. Subsequently he added his collections of plants from the younger epochs, insects (including a great number of types and undescribed species), myriapods, crustaceans, and fishes. The magnitude and importance of these collections have already been referred to in the Reports of the National Museum.^a

In the departments of paleozoic plants, fossil insects, and fishes the Lacoe collection was not only far more extensive than the previous collections in the Museum, but it also rendered the two sections first named hardly inferior to any in the world. The number and biological range of the types in the Lacoe collection will be shown in the paleontological catalogue now in course of preparation.

The history of Lacoe's gifts to the United States National Museum has already been given by the assistant secretary and the curators, but reference may well be made again to the simple and patriotic terms of the gift—i. e., that it be kept entire, with such additions as might be made to it by exchange or subsequent contributions by the donor; that it be known as the Lacoe collection, and that it be accessible to scientists and students without distinction, under such proper rules and restrictions as may be deemed necessary for the preservation of the specimens from loss or injury. These informal yet wise provisions, attending the most important gift that the Museum has yet received, afford, as Professor Ward has happily said,^b "just ground for national scientific pride, while the liberal public spirit with which it was given is worthy of imitation by all patrons of science." They are typical of Lacoe's scientific spirit, generosity, and devotion to paleontology.

^a Report U. S. National Museum, 1892, pp. 186–188; 1886, pp. 71–74.

^b *Idem*, p. 188.

In his quiet home life Lacoe was gentle, dignified, and somewhat diffident. He was thoughtful, often serious, yet sympathetic and keenly appreciative of the humorous. He was pure and upright in all his life. He was esteemed by the entire community and beloved by all who were so fortunate as to enjoy his acquaintance.

Though having but a common-school education in his youth, he later made himself well read, particularly in the general sciences. In the literature relating to fossil plants and insects his library has few equals in America. His knowledge of paleozoic plants was expert; yet he was so modest and so lacking the ambition of authorship that he preferred to have the materials of his collections described by others. His own writings are confined to several pamphlets, chiefly of the nature of catalogues.

During the later years of Lacoe's life the purpose to aid in the increase of knowledge by promoting the study of fossil plants and insects became more clearly defined, and found expression in more systematically and wisely directed efforts. In the field of fossil plants he sought to gain material from the paleobotanically less known formations whose fossils should throw greatest light on floras already known. In the insect world, instead of collecting fossils at random, and thus continuing the speculations as to the affinities of the older forms, he had engaged in methodically and extensively collecting insect remains from the later geological formations in order that they might be studied in connection with their survivors among living insects, his idea being that the insects of each successively earlier period should be mutually studied and interpreted in the light of the ascertained characters and relations of the later times, the result of such studies being a more satisfactory elaboration of a genetic and natural classification of both fossil and living types. Arrangements were being made by Lacoe for carrying out these broad and philosophical plans when a brief but fatal illness cut short his great work. The Lacoe collections in the National Museum form a most appropriate and lasting monument to the memory of this noble and patriotic patron of the sciences for which they stand.

Mr. George A. Boardman, for many years a correspondent of the Smithsonian Institution and an intimate friend of Professor Baird, died January 11, 1901, at his home in Calais, Maine, aged 83 years. Mr. Boardman was born in Newburyport, Massachusetts, on February 5, 1818, his ancestors having come to that locality on May 10, 1637, from Yorkshire, England. Removing to Calais, he became extensively engaged in the lumber business, from which he retired with a competence in 1871, the subsequent years of his life being largely devoted to travel and to the more active pursuit of his favorite study, ornithology. From 1871 to about 1887, he spent the winters in Florida, going and returning by way of Washington, and usually stopping, sometimes for

a week or more, in order to study the collections of the National Museum, where he formed the acquaintance of the scientific staff and preparators, to whom he was always a welcome visitor on account of his genial, friendly manner, and interest in their occupations.

Mr. Boardman's interest in ornithology was mainly from the point of view of a sportsman and lover of nature. He did little in the way of collecting except to bring together a very complete and valuable series of the birds of Calais and vicinity, consisting of specimens chiefly mounted by himself, which is to be placed in one of the provincial government buildings at Fredericton, New Brunswick. His principal contribution to ornithological literature is his "Catalogue of the birds found in the vicinity of Calais, Me., and about the islands at the mouth of the Bay of Fundy," published in the Proceedings of the Boston Society of Natural History (1862); but he also wrote many minor articles on natural history for the *American Naturalist*, *Forest and Stream*, and other periodicals of like character. His relations to the Smithsonian Institution were rather as a correspondent and friend of Professor Baird than as an extensive contributor to its collections, though many interesting and valuable specimens were received from him at various times.

REPORTS OF HEAD CURATORS.

REPORT ON THE DEPARTMENT OF ANTHROPOLOGY - - - - -	By WILLIAM H. HOLMES.
REPORT ON THE DEPARTMENT OF BIOLOGY - - - - -	By FREDERICK W. TRUE.
REPORT ON THE DEPARTMENT OF GEOLOGY - - - - -	By GEORGE P. MERRILL.

REPORT ON THE DEPARTMENT OF ANTHROPOLOGY FOR THE YEAR 1900-1901.

By WILLIAM H. HOLMES,

Head Curator.

The year has been one of unusual activity, the volume of business transacted by the Department far exceeding that of any previous year. This condition is due in part to the fact that exhibits were collected and prepared for the Pan-American Exposition at Buffalo. More than half the force of the Department were engaged upon this work almost exclusively for a period of six months. A detailed account of the exhibits displayed at Buffalo is appended to this report.

The accessions for the year are more numerous than usual and of exceptional scientific value. Of those deserving special notice, received by the Department and assigned to the various divisions and sections, the following may be mentioned:

COLLECTED FOR THE MUSEUM.

Ethnological material from Polynesia, Micronesia, Melanesia, etc., collected for the Museum by Mr. C. H. Townsend and Dr. H. F. Moore, naturalists on the U. S. Fish Commission steamer *Albatross* during the expedition of 1899-1900 to the Tropical Pacific, under the direction of Alexander Agassiz. This is a second installment of the collection made by these gentlemen, the larger part having been received during the previous year. The total number of specimens obtained is 330.

Ethnological material from the Panamary Indians and other tribes of the upper Purus River, in Brazil, collected by Prof. J. B. Steere, of Ann Arbor, Michigan.

Implements and rejectamenta of manufacture from an ancient flint quarry in Union County, Illinois, collected by W. H. Holmes, head curator; 455 specimens.

Ethnological material from the Bororo Indians of Matto-Grosso, in Brazil; collected by Rev. William A. Cook, through the courtesy of Dr. Orville A. Derby, director of the geographical and geological survey of the province of São Paulo, Brazil; 123 specimens.

Ethnological and archeological specimens obtained from the Mission Indians of southern California; collected by Mr. Horatio N. Rust, South Pasadena, California; 136 specimens.

Ethnological collections from the Indian tribes of British Columbia and Alaska; collected by Lieut. George T. Emmons, U. S. Navy; 157 specimens.

GIFTS TO THE MUSEUM.

Collection of prehistoric stone implements and other relics, principally from Maryland, presented by Dr. J. D. McGuire, of Ellicott City, Maryland; 7,211 specimens. This collection comprises a great body of interesting and valuable material, and is the most important one ever made by a single collector within the Chesapeake region, being of exceptional scientific value.

Ethnological objects from the East Indies and the Malay peninsula; gift of Dr. W. L. Abbott; 21 specimens.

Ethnological objects from the Philippine Islands, gift of Gen. James M. Bell, U. S. Volunteers; 35 specimens.

Ethnological and archeological collections from the Pueblo Indians, the Alaskan Eskimo, and from Mexico; gift of E. W. Nelson; 39 specimens.

Collection of flint implements and rejectamenta of manufacture from ancient flint quarries in Egypt; gift of H. W. Seton-Karr, London, England; 281 specimens. This is a most important collection, illustrating the quarrying and stone-shaping arts of the primitive Egyptians.

Collection of stone implements from Owego, Tioga County, New York; gift of A. F. Barrott; 250 specimens.

Swords, pistols, medals, spurs, and shoulder straps presented to Gen. George W. Morgan, U. S. Army, for services during the Mexican and the Civil Wars; gift of Mrs. Morgan.

Lock and key to the Emperor's gate of the "Forbidden City," Peking, China; gift of Rev. W. T. Hobart.

Sword, hat, commissions, and other memorials of Gen. Thomas Swords, U. S. Army, who served during the Mexican and the Civil War; presented to the Smithsonian Institution by Mrs. E. H. Cotheal.

Maunday money, the last issued during the reign of Queen Victoria; gift of Edward Lovett.

A collection of 62 coins, medals, and tokens, ancient and modern; gift of E. J. Sears.

Two direct photographs in natural colors; made and presented by Prof. G. Lippman. One represents the solar spectrum, and the other a group of fruit and richly colored vases.

Twenty-nine photographs relating to the solar eclipse, 17 of which were presented by Prof. William Libbey, of Princeton University, and 12 by the Smithsonian Eclipse Expedition of 1900.

Faësimile reproductions of ancient Mexican codices, as follows: Tonalamatl der Aubin'schen Sammlung; Codex Telleriano Remensis; Codex Vaticanus 3773; Codex Vaticanus 2738 (del Rios); Codex Borgia; Codex Bologna; gift of the Duc de Loubat. These reproductions are of the greatest value to students of aboriginal American culture.

A Siemens galvanometer, presented by Mr. H. B. Ledyard, president of the Michigan Central Railroad Company. This type of galvanometer, made by Siemens Brothers, of London, was introduced into this country about 1870, and for ten years or more was generally used for testing telegraph lines and for other electrical work.

A number of historical telegraph instruments and insulators; gift of J. H. Bunnell & Co., New York City.

A collection of typical bare and insulated aluminum electrical conductors; gift of the Pittsburg Reduction Works, Pittsburg, Pennsylvania.

Examples of the submarine telegraph cables laid between the main coast of Massachusetts and Nantucket Island in 1856 and 1858, and other typical cables; gift of George C. Maynard; three specimens.

A bronze bust of Charles H. Haswell, the first engineer in chief of the U. S. Navy; executed by U. S. J. Dunbar, and presented to the Museum by Commander George W. Baird, U. S. Navy, on behalf of the subscribers.

A gramophone of the latest type, with accessories, showing the method by which the sound is recorded on a zinc plate, transferred to a hard rubber plate, and reproduced by the gramophone; gift of Emil Berliner, Washington, District of Columbia.

One cylinder, three cross heads, and four eccentric rods belonging to the locomotive Stourbridge Lion; gift of Mr. G. T. Slade, general manager of the Erie and Wyoming Valley Railroad Company, Dunmore, Pennsylvania.

A number of military and sporting guns of the latest patterns; gift of the Remington Arms Company, Ilion, New York.

PURCHASED BY THE MUSEUM.

Stone implements from an ancient village site, Big Kiokee Creek, Columbia County, Georgia; collected by Dr. Roland Steiner, Grovetown, Georgia; 18,907 specimens.

Collection of small arms, etc., from Mr. William C. Dodge, Washington, District of Columbia; 52 specimens.

Passenger cart formerly used in royal processions in Korea; from Mr. H. P. Hulbert, Seoul, Korea.

Babylonian seals and inscribed earthenware bowls, acquired from Rev. Gabriel Oussani, Bagdad, Turkey. Many of these seals are rare and of much interest to orientalists, and the inscribed bowls are

of importance to the student of religious views and practices, revealing, as they do, a peculiar phase in the development of religious ideas under various heterogeneous influences.

Leaf-shaped flint implements from a mound in Scott County, Illinois; from Mr. C. E. Clifton, Washington, District of Columbia; 143 specimens.

Stone implements, pottery, etc., from southern Jamaica, West Indies; collected by Mr. Robert C. MacCormack, Salt River, Jamaica; 319 specimens.

Leaf-shaped flint implements from a cache, plowed up in Jackson County, Indiana; from Mr. L. W. Stillwell, Deadwood, South Dakota; 30 specimens.

Antiquities from the islands of St. Kitts, St. Bartholomews, Nevis, and Santa Lucia, West Indies; from Dr. C. W. Branch, St. Kitts; 330 specimens.

Archeological collection from the northwest coast of America; from Lieut. George T. Emmons, U. S. Navy; 248 specimens.

Ethnological material from Indian tribes of the Great Plains; collected by Capt. Paul B. Carter; 114 specimens.

Stone implements, etc., from California, Alaska, Hawaii, Fiji, etc.; obtained from Mr. Nathan Joseph, San Francisco, California; 43 specimens.

Ethnological objects, consisting of porcelain, lacquer, metal work, embroideries, etc., from China, Japan, and Korea; obtained from Miss M. A. Shufeldt; 177 specimens.

Portraits of American Indians (oil colors), by Mr. J. H. Sharp, Cincinnati, Ohio; 11 specimens.

Ethnological objects from the Bella Coola Indians, British Columbia; obtained from Mr. I. Fouquer, Crookston, Minnesota; 130 specimens.

OBTAINED THROUGH EXCHANGE.

Collections from various tribes of the Upper Paraguay River, viz, the Omiris, Kechuas, Chamacoco Brabos, Chamacoco Mansos, Lenguas, Cuximanapanas, Guanas, Corvados, Angaytes, Matacos, Sanapanas, Caiuguas, Tupis, Cadocas, Apiacas, Guatos, Guaranis, Payaguas, Parecis, Tobas, Chavantes, and Coroados; collected by Dr. Emil Hassler and procured in exchange from the Field Columbian Museum; 417 specimens. This is part of the great collection exhibited by Dr. Hassler at the World's Columbian Exposition in 1893.

Two altars in combined Gothic, Renaissance, and Rococo style, valuable and interesting from an archeological and art-historic point of view. They are also important from the fact that they will form a suitable center for the proposed exhibit of ecclesiastical art in the Museum.

The specimens received during the year have been catalogued and cared for in the usual way, but the available spaces are already so fully occupied that new material can not be placed on view save by storing the earlier collections. The Department has not been able to add to its case room, and storage facilities remain, as before, entirely inadequate. Owing to the lack of laboratory space one or more of the halls have been closed throughout the year as workrooms, and no little confusion has resulted from this and the disturbance due to the selection, mounting, labeling, and boxing of exhibits for the Pan-American Exposition.

The work of labeling the Museum exhibits has been continued, and very considerable advances have been made in the direction of printing, framing, and placing case labels in various halls.

The following details with regard to progress made in preserving and installing the collections of the Department are introduced from the reports of the heads of divisions and sections:

Prof. Otis T. Mason, curator of the Division of Ethnology, says that—

No hall or collection has been installed in the division during the fiscal year 1901. Most of the time of my assistants has been taken up with the preparation of exhibits for the Pan-American Exposition. For the preservation and installation of specimens in my custody the space and resources are well-nigh exhausted, and I hail with pleasure the announcement that new galleries are to be erected to relieve the situation.

The continued ill health of my clerk made it necessary to employ expert help temporarily. I was fortunate in securing the services of Miss Harriet G. Fracker, whose long connection with the Intercontinental Railway Commission fitted her for the difficult task of preparing labels and of reading proof in Spanish, French, and German.

Dr. Hough, assistant curator of this division, spent a good portion of the year in getting together materials for the Pan-American Exposition and in cataloguing accessions, and in May proceeded to New Mexico and Arizona for the purpose of conducting explorations in conjunction with Mr. Peter G. Gates.

The following-named halls are used for exhibition:

(a) The west north range is devoted to North American tribes. Twice the area here provided is required to show adequately the industrial life of our tribes. We are rich in material of this sort and it should be displayed.

(b) The north west range. The Eskimo collections occupy about one-half of the range, and might well take the entire space. After the return of the Pan-American material this whole collection should be reinstalled. The southeastern Alaskan collection occupies only the north end of the range, a space entirely inadequate to its exhibition. The entire range should be either Eskimo or Indian.

(c) The northwest court is given up entirely to the tribes of the arid region of southwestern United States. The rich pottery collection here crowds out other considerations. It would require four times the space to install properly the collections from this area.

(d) The northwest gallery is devoted to basketry on two sides, to the Republic of Mexico on the north side, while the whole of Central and South America are crowded into the cases on the south side. I do not know what I am going to do with the

large collections coming in from that region. Ten thousand feet of floor space would not be too much at once for the installation of this fine material.

(c) The Indo-Pacific collections are displayed on the north gallery of the west hall. The cases are now crowded and yet not all of the precious Wilkes exploring expedition specimens are installed. What are we to do when the vast Philippine collections arrive in November?

But the worst conditions, perhaps, exist in the west hall. As you enter it from the rotunda you have the spoils of ancient classic art—Hamite, Semite, and Aryan—in two alcoves. The rest of the space is devoted to modern Europe, Asia, and Africa, a subject demanding 30,000 square feet, if not more.

Incidentally connected with the ethnological exhibits are many technical series in which a single art or device is traced through its ethnic distribution and its historic elaboration.

The study series of ethnology are to be found:

(a) In the tower rooms of the west balcony, which are inaccessible, crowded, and dirty.

(b) In the drawers on the west balcony, where the specimens are quite accessible and in good condition.

(c) In table and other cases all about the building, which is not satisfactory, as the temptation to use this space for storage or stowage is very great.

(d) Hidden away behind the pottery in pueblo court and piled up behind the graphic arts exhibit.

Again, there is no place in which to study the specimens, excepting our own public offices, where the student is subject to all sorts of interruptions, and I trust that measures can be taken at once toward providing a laboratory of ethnology, where those who desire to make wide comparisons of things may have opportunity to spread them out.

Dr. Cyrus Adler, assistant curator, Division of Historic Archeology, reports as follows:

Some changes and additions have been made in the Section of Biblical and Palestinian Antiquities. Casts are being made of the collection of oriental seals and the inscribed magic bowls are being photographed preparatory to a study of their significance.

The collection is installed in the two alcoves west of the rotunda in the following manner:

North alcove, Biblical and Palestinian antiquities (manuscripts and editions of the Bible, musical instruments, mineralogical and botanical specimens, dress, ornaments, and utensils of the East), in a wall case; monuments found in Palestine (Moabite stone, Siloam inscription, Temple stone), Assyrian statues and slabs, on the floor, the walls, and screens.

The south alcove holds the collection of Egyptian antiquities (mummies, mummy cases, and other funerary paraphernalia, statues, busts, reliefs, ornaments, etc.) in a wall case, on the floor, and on screens; the mosaic from Carthage; the statues from north Syria, and Hittite casts; the Persepolitan casts.

On the top of the wall cases of both alcoves the larger casts of Greek and Roman mythologic subjects have a place.

As custodian of Historic Religious Ceremonials, Dr. Adler writes:

The two antique German altars recently acquired were restored and renovated, with the addition of tables to both and a tabernacle to one of them. The larger one was installed on the center balcony of west hall, facing the rotunda. Some changes and additions were also made in the sections of the Jewish religion and Brahmanism, and additional labels were prepared.

The collections on exhibition are installed in the south gallery of the west hall, in the following order, beginning at the entrance from the rotunda: Jewish religion in two arch cases and three wing cases; Mohammedanism in one arch case and two bay cases; Greco-Roman religion in one arch case and three wing cases; Brahmanism in one arch case and one Kensington case; Buddhism in two arch cases, four wing cases, and one special case; Shintoism in one wing case; objects of other east Asiatic religions in one wing case and one Kensington case; a collection of amulets in one Kensington case.

The entire collection of objects of Christian ceremonial, as well as a number of objects belonging to other religions, are, on account of lack of space, for the present in storage boxes.

A Bibliography of Assyriology from the beginning to 1900, inclusive, has been commenced by Dr. Adler, and in the Division of Religions the work on the Benguiat collection of objects of Jewish ceremonial, with 36 plates, has been completed and published.

Mr. A. H. Clark, custodian of the Section of American History, reports as follows:

The collections of this section have all been rearranged and put in order so that they are now in satisfactory condition except as to labels.

Typewritten labels accompany nearly every object exhibited. A large number of valuable objects are in storage for want of exhibition room, and it is important that the side cases now devoted to musical instruments be given up to objects of history.

There are large collections of medals and coins now of little public use for study or for exhibition through lack of proper facilities for their arrangement and some step should soon be taken to make these valuable collections available.

The portrait collection, now practically in storage, could be made accessible at little expense by the erection of a gallery in the north tower office, as already recommended.

The collections of this section are now catalogued, and it is believed that the condition of the specimens is in every way as satisfactory as could possibly be expected. Much credit is due to my assistant, Mr. Paul Beckwith, for his labors in this section.

Dr. Thomas Wilson, curator of the Division of Prehistoric Archaeology, makes the following report:

The usual routine course in the reception, marking, and display of specimens was pursued during the year. For details relating to these topics reference should be made to my reports for the two preceding years.

We have continued our work in the rearrangement of specific displays, endeavoring to bring together objects which there belong. The system adopted, of a geographical subdivision, coupled with the immense mass of objects which we have, renders this labor almost continuous. The objects are delivered to us en masse and have to be segregated; this, with the same labor continued and applied to the 200,000 specimens under our care, makes a task which can never be fully completed.

The objects on exhibition are becoming crowded, and with almost every accession there must be a rearrangement to afford room for these new arrivals.

Special investigations conducted during the year by members of the Department staff may be briefly summarized as follows:

The head curator has, as in preceding years, devoted most of his time and energies to the work of the Department, transacting routine business, perfecting its methods and facilities in caring for and installing collections. He has found time to complete a report on ethnolog-

ical and general archeological observations made in the far West during previous years. This will appear in the Annual Report of the Museum for 1901. In addition, he has spent much time in completing the manuscript and illustrations for a large work on ancient pottery of the United States, begun some years ago, and has entered upon the work of preparing a full report on the great industries of mining and quarrying among the native tribes.

As already mentioned, a large part of the year has been taken up with the preparation of an exhibit for the Pan-American Exposition. This work consisted of the construction of life-sized lay figure groups of type tribes of our aborigines, comprising some 60 figures of men, women, and children. The designing of the groups and the supervision of the work fell almost wholly to the lot of the head curator. The same may be said of the preparation of 16 dwelling group models described in connection with full accounts of the lay figure groups in the appendix to this report.

Professor Mason, curator of the Division of Ethnology, has published in *The Anthropologist* a paper on American basketry technic and made investigations for enlarging this study for a monograph on the subject. He had given much time to the ethnology of the Philippine Islands, so as to be prepared for any questions that might arise, and has, in association with the head curator, compiled a paper embodying detailed instructions to collectors in the Philippines. He translated for the Secretary, who has published them in his report, the papers of Blumentritt and Virchow on this subject, and assisted, as a member of the United States Board on Geographic Names, to fix the nomenclature of the islands.

Professor Mason has also completed a study on American aboriginal harpoons and has read the proof of the result, which will appear as a paper in the Museum report for 1900.

On the return of Col. F. F. Hilder from the Philippines, Professor Mason undertook the task of cataloguing the large collection made, and the elaborate labels used on the collection at the Pan-American Exposition were all prepared by him. During the winter much of Professor Mason's time was taken up in preparing labels for the extensive ethnological exhibit made by the Department of Anthropology at this exposition.

Dr. Thomas Wilson, Curator of the Division of Prehistoric Archeology, was invited by the Secretary of the Smithsonian Institution, at the beginning of the present fiscal year, to attend a series of international congresses to be held at Paris, France, during the exposition of 1900, and sailed for that country on the Netherlands steamer *Maasdam* on August 4, arriving at Boulogne-sur-Mer on the 13th. He attended the Congress of Anthropology and Prehistoric Archeology, before which he presented two papers: "Prehistoric archeology in America"

and "A classification of arrowpoints, spearheads, and knives of prehistoric times." He was present at the Congress of Ethnology, and was presiding officer during one day. At the Congress of Americanists he presented a paper on "Jade in America." These various communications were translated into French, and left, with the necessary illustrations, in custody of the proper committees for publication.

On his return from Paris he prepared a summary of the reports of proceedings of the International Congresses of Anthropology and Prehistoric Archeology and of the Congress of Americanists, which were sent to Prof. J. H. Gore, commissioner, to be transmitted by him in his formulation of the reports of Mr. Ferdinand Peck, United States commissioner to the Paris Exposition of 1900.

Dr. Wilson has completed a translation into French of his paper on "The antiquity of the red race in America," which appeared in the U. S. National Museum Report for 1895, and this translation has been published in *L'Anthropologie* for the current year (p. 41), under the title of "*L'Antiquité des peaux-rouges en Amerique.*"

A paper on "Criminology" was read by him before the American Association for the Advancement of Science at its forty-ninth meeting, in New York, June, 1900, and has been published in the proceedings of that association for 1900.

His investigations into prehistoric trepanation have been continued, and his paper on that subject has been completed and presented for publication by the Museum.

He was engaged during the year, at the request of Mr. H. R. Bishop, of New York City, in the preparation of a paper on "Jade," which is now completed and will shortly be ready for publication.

Dr. Wilson has been interested in determining, so far as possible, the truth of the allegation that prehistoric man was ambidextrous. He has obtained from the Carlisle and Hampton schools reports as to the proportion of right and left handedness among the tribes there represented. In continuation of this subject he has made a considerable examination of such prehistoric tools and implements as are contained in the Division of Prehistoric Archeology, with a view of determining the proportion each way. Nearly all of these tools were adapted to either hand; but the hatchets or gouges made of the fulgur shell and used with a handle which had been inserted afford a basis for comparison, and the study of these has been nearly completed.

Explorations conducted for the purpose of enriching the collections of the Museum have been made by members of the Museum staff and other experienced collectors. The head curator visited the vicinity of Mill Creek, Union County, Illinois, to join Dr. W. A. Phillips, of the Field Columbian Museum, in the examination of the very extensive and important flint quarries at that place. A large collection of implements and of quarry shop rejectamenta of numerous varieties was

secured. Dr. Walter Hough began work in connection with Mr. Peter G. Gates in the Pueblo country, in June, and by the end of the fiscal year had reported very flattering progress. Prof. J. B. Steere, of Ann Arbor, Michigan, made collections on the Upper Purus River, in Brazil. William A. Cook forwarded many valuable objects from the Bororó, a Tupian tribe dwelling near the headwaters of the Paraguay, in Brazil. Lieut. G. T. Emmons, U. S. Navy, secured much valuable material from British Columbia and Alaska; and of special interest and importance is the outfit for a Chilcat family, now utilized in one of the Pan-American Exposition lay-figure groups.

Two expeditions sent out by the Government board of the Pan-American Exposition secured most valuable accessions, now displayed at Buffalo. These expeditions were conducted, one by Dr. W J McGee, in Sonora, Mexico, and the other by Col. F. F. Hilder, in the Philippines.

Dr. Roland Steiner, though not officially attached to the Museum, continued his investigations and searches into quarries, workshops, and village sites of his own neighborhood near and at the mouth of Shoulderbone Creek and on Little Kiokee River, Georgia, and has collected many thousands of specimens of prehistoric artifacts, all of which are now deposited in this Museum.

Seven papers on anthropological subjects have been furnished during the year by members of the staff of this department. Two are by the head curator, Mr. W. H. Holmes. One of these relates to the obsidian mines of Hidalgo, Mexico, while the other is a review of the evidence relating to early man in California, as furnished by the auriferous gravels.

The curator of ethnology, Prof. Otis T. Mason, prepared a paper entitled "Traps of the Amerinds," which was published in the Proceedings of the American Association for the Advancement of Science; also one relating to the pointed canoes of the Kootenai River in Washington and those used on the Amur, and a third, describing a primitive heddle frame for weaving narrow fabrics, in use among the Indians of the Mississippi Valley and the Pueblo region, and also throughout the Eastern States and in Europe.

The full titles of all these papers will be found in the bibliography (Appendix IV), arranged under the names of their respective authors.

Facilities for the study of museum collections have been afforded a number of students. Much material relating to primitive games has been forwarded to Dr. Stewart Culin, of the Museum of Science and Art, in Philadelphia; and various articles bearing upon Asiatic contact with the west coast of America have been placed at the disposal of Dr. Franz Boas, of the American Museum of Natural History, New York.

It has given curators of the Department much pleasure to aid post-graduate students, journalists, teachers with their classes, public lecturers, and specialists in all branches of anthropology. The collections have been made available to the fullest extent to all students.

The following objects from the marine architecture collection were lent for exhibition at the Pan-American Exposition: The original Francis life-saving car, to the U. S. Life-Saving Service, and seven boat models to the U. S. Fish Commission.

The specimens of earliest electrical apparatus belonging to the American Institute of Electrical Engineers and to Miss Sarah J. Farmer, and deposited in the Museum, were forwarded, at the request of the owners, to Mr. Francis E. Drake for exhibition at the Paris Exposition. They have been returned, but many of the objects are in such a badly damaged condition as to be entirely unsuited for further exhibition.

A series of spindle whorls was lent to Miss H. Newall Wardle, Academy of Natural Sciences, of Philadelphia, Pa., at the request of Dr. Dixon, for purposes of study.

The demand for collections for exposition display has been unusually great, and objects aggregating in value many thousands of dollars are now installed in the Government building at Buffalo. The wear and tear upon many of these specimens is serious, and it may seem wise in future for the Museum authorities to take steps toward counteracting the deterioration that comes from exposure, use, and the vicissitudes of shipment and reshipment.

REPORT ON THE DEPARTMENT OF BIOLOGY FOR THE YEAR 1900-1901.

By FREDERICK W. TRUE,
Head Curator.

The past year has been remarkable for the amount of scientific work accomplished, and has been especially marked by the completion of preparations for participation in the Pan-American Exposition and the installation of the Children's Room under the immediate direction of the Secretary. The additions to the collections have been numerous and as a whole compare favorably in scientific value with those of any recent year.

THE EXHIBITION COLLECTIONS.

In those years in which the Museum participates in a large exposition or world's fair, as has been the case this year, improvements in the regular exhibition series advance slowly, for the reason that the preparators and mechanics are necessarily diverted from their regular duties. Although large numbers of interesting objects were prepared for the Pan-American Exposition, they can not, of course, be incorporated in the regular exhibition series until after the close of the exposition. The benefit of the work accomplished during the year covered by this report will not, therefore, be felt until the ensuing year.

For reasons which will be explained elsewhere, the exhibit prepared for Buffalo consists entirely of American vertebrates. It includes many large, characteristic American animals, such as the Kodiak bear, Glacier bear, Alaska moose, white sheep, musk ox, West Indian seal, condor, rhea, bald eagle, boa constrictor, alligator snapper, Galapagos turtle, various large fishes, etc. These are all of the highest grade as regards taxidermy and for the most part unrepresented in the regular exhibition series. They will add materially to the effectiveness of the exhibition halls when returned from Buffalo.

One of the most important operations of the year, as already stated, was the installation of collections in the Children's Room in the Smithsonian building. This room was assigned by the Secretary of the Institution for a collection which should be in every respect suited to the comprehension of children. The room was entirely refitted under competent architectural advice and is now the handsomest room in

the Museum. The windows were reconstructed so as to give the maximum amount of light, by inserting plate glass in the wall without the intervention of sashes. The walls were painted a pleasing color and the ceiling decorated in an elaborate manner with frescoes representing a bower of vines, with birds perched at the various openings. The floor was relaid in marble mosaic. The cases are of maple, finished as light as possible and made low enough for a child to see on the top shelves. The shelving is of glass. Two aquariums have been placed in the center of the room, one furnished with a fountain and intended for fresh-water animals, the other for salt-water animals. A large bird cage containing bright-colored birds and songsters is suspended from the ceiling.

The following series of objects selected by the Secretary have been installed in the cases: (1) A series of familiar American birds; (2) common European birds; (3) large birds of prey; (4) interesting water birds; (5) curious birds, such as the crocodile bird, kiwi, etc.; (6) some brilliant-colored birds; (7) curious nests and eggs; (8) a series of specimens with accessories representing protective mimicry, under the caption, "How creatures hide;" (9) remarkable insects; (10) bright-colored shells; (11) other interesting invertebrates; (12) remarkable minerals. In addition, the bower of a bower bird is exhibited and a number of Audubon pictures representing birds in action.

The labels are adapted to the comprehension of children, being in untechnical language throughout. They are printed in large type and contain interesting information regarding the habits of birds, etc. It is confidently anticipated that the airiness and beauty of the room and fittings and the beauty and brilliancy of the exhibits will prove exceedingly attractive to children and hardly less so to older persons.

At the beginning of the year a new terrazzo floor was laid in the southeast range, containing the exhibition series of reptiles, batrachians, and fishes, and the cases were reassorted and arranged with special reference to the lighting and all extraneous objects removed. Toward the close of the year two windows which were formerly obscured by the roof of the restaurant outside were opened again, and the hall, in spite of the rather low ceiling, is now one of the best lighted in the building. The fishes occupy upright cases along the walls, and the reptiles and batrachians a series of floor cases with sloping tops. These latter are not the best that could be designed for this purpose; but as no new ones could be built, it was necessary to make use of them. The exhibit consists of casts of North American species. It is intended to supplement these by collections of South American and Old World species in liquid.

The question of the best form of preparation for an exhibition series of lower vertebrates is one which has occupied a good deal of attention.

Painted casts can never be actual facsimiles of the animals as they appear in life, and for that reason are less valuable than preparations of specimens. The painting of casts in life colors by competent artists involves very large expense. Furthermore, such casts are rather art objects than natural history specimens. On the other hand, there is no known method of retaining life colors in specimens preserved in liquids, and such specimens are therefore less attractive to the public than they should be. In certain European museums a method of painting the actual specimens with pigments which resist the action of the preservative liquids has been employed. This may prove a solution of the difficulty. A number of experiments with this process and also with formalin preparations were made during the year, and it is expected that a conclusion will soon be reached as to the method or methods which can be most profitably employed in the enlargement of the exhibition series. At present it seems probable that for large and medium sized species of North American fishes, batrachians, and reptiles it will be best to continue to make painted casts, ignoring the fact that the colors as represented are more or less diagrammatic; that for exotic species, especially those inhabiting remote parts of the world, and for all very small species, specimens in formalin or alcohol, painted or not, will necessarily be employed.

The exhibit at present consists of 167 fish casts, 73 reptile casts, 11 batrachian casts, 2 large stuffed sharks, an alligator, and a group illustrating the habitat of a species of goby.

Some highly successful experiments have been made in constructing composite preparations of turtles by casting the head, tail, and limbs and fitting them into the natural shell or carapace.

A small series of deep-sea fishes, about 25 or 30 in number, was placed on exhibition. As these fish are almost invariably much mutilated when dragged from the deep sea, they are not well suited for public exhibition. To supplement them a series of colored figures, chiefly from Garman's "Deep-Sea Fishes" and from Goode and Bean's "Oceanic Ichthyology," is exhibited with the specimens, which they serve to explain. In connection with the exhibit for the Pan-American Exposition an enlarged model of one of the luminous deep-sea species was prepared, and a typical series of similar casts will probably be prepared during the coming year.

The walls of the entrance hall of the Smithsonian building were repainted during the year, and a better background obtained for the game birds, fishes, and large mammal heads there exhibited. A plan was perfected for reorganizing the exhibit of game birds and rendering it more effective by replacing single specimens by groups with accessories representing the birds in their native wilds. A series of

twenty groups, each about 2 by 3 feet, are in contemplation, four of which have already been completed.

A large amount of work was done by the taxidermists in remounting old specimens of value in the regular faunal exhibition series of birds, and one taxidermist was continuously engaged in overhauling the collection to keep it from deterioration. This is made necessary on account of the imperfect condition of the cases which are now at least twenty-five years old and far from being dust and vermin proof.

New labels were prepared for the American carnivorous mammals in the large wall case on the east side of the south hall, completed two years ago. It was found necessary to store a large lot of boxes of mounted birds in the west side of the hall behind the detached cases containing the groups of large mammals. As these were very unsightly the back glass of the cases was painted and wooden partitions were set up between them. This is only a temporary provision. Nothing was done directly by way of adding to the series of mounted mammals, on account of the preparations for the Buffalo Exposition, as already explained.

Early in the autumn experiments were begun looking toward the construction of exhibition boxes for insects. It was thought that this seemingly trifling matter could be disposed of in a week or two, but, in fact, to obtain an immaculate surface in the boxes on which the insects could be pinned and which would not warp during changes in the weather proved to be a task of no small magnitude and baffled the ingenuity of the Museum mechanics for many months. Toward the close of the year the desired background was at last obtained by the use of specially prepared cork and blotting paper, and the few boxes filled have proved quite satisfactory. It is expected that the whole exhibition series will be reorganized and transferred to the new boxes during the coming year.

A new series of enlarged models representing the structure of feathers was placed on exhibition in the hall of comparative anatomy during the year, and a part of the other models were transferred to new cases with large glass.

EXPLORATIONS.

In the spring of 1901, by arrangement with the Museum, Mr. Dane Coolidge made extensive collections of mammals in the mainland of Italy and in Sicily and southern France. Mr. G. S. Miller, jr., engaged in collecting operations in the vicinity of Peterboro, New York, in July and August, 1900. An arrangement was made with Dr. E. A. Mearns, U. S. Army, to engage in explorations in central Florida, and especially to visit various type localities for mammals. He was in the field from February to May, 1901, and made large collections, especially along the Kissimee River. Toward the close of the year Mr. W. H. Ashmead

was detailed to make entomological collections in the Hawaiian Islands, taking advantage of the excellent opportunities for transportation, etc., afforded on account of the marine work being carried on from island to island by the U. S. Fish Commission. Further advantage was taken of the operations of the Commission by detailing Dr. J. E. Benedict to accompany the steamer *Fish Hawk*, which was engaged in an investigation of the offshore fishing banks in the Gulf of Mexico opposite Anelote River, Florida. By invitation, Mr. Charles T. Simpson accompanied Mr. J. B. Henderson, jr., in conchological explorations about the islands of Haiti and Jamaica. About six weeks in November and December were spent in this work.

In addition to the collecting parties sent out last year in behalf of the Pan-American Exposition, Prof. J. B. Steere made explorations along the Amazon River, Brazil, in the spring of 1901, and Messrs. Barton A. Bean and William H. King collected fishes at Key West, Florida. Messrs. Palmer and Riley, who visited Cuba on behalf of the Exposition, and Mr. M. W. Lyon, jr., who made collections in Venezuela, returned to the United States in August.

In July, 1900, Messrs. Charles L. Pollard and William R. Maxon made botanical explorations in Alabama, Georgia, and Tennessee, obtaining collections of much interest. In May, 1901, Mr. Pollard visited the mountains of North Carolina and obtained a rich collection of violets, as well as other plants.

ACCESSIONS.

In the majority of divisions of the Department the accessions surpassed those of last year in number and were of equal or greater importance. The increase in mammals was 2,593 specimens, a very large number. Of insects a smaller number was received—37,000, as compared with 85,000 last year—but the value scientifically was not inferior. The accessions of birds' eggs far surpassed those of last year in number and value. The importance of the accessions to the Division of Marine Invertebrates was much greater than last year. On the whole the year may be considered as more than ordinarily prosperous.

Dr. W. L. Abbott continued his extensive natural history explorations in the East Indies, and contributed large collections of mammals, birds, reptiles, mollusks, insects, and marine invertebrates from the Natuna Islands, the Mergui Archipelago, and the coast of Tringanu (Malay Peninsula). About twenty new species of mammals have been detected in these collections, and there are doubtless others, as well as new birds, reptiles, etc. These collections constitute additions of great importance.

While stationed at Newport, Rhode Island, Dr. E. A. Mearns, U. S. Army, made extensive zoological collections in all classes, which he

presented to the Museum. Later, as already stated, arrangements were made with him to collect small mammals from type localities in Florida, especially along the Kissimmee River. He obtained about 300 mammals, some 600 birds, including many in plumages not previously represented in the Museum collections, such as the downy young of the Florida Dusky duck, etc.; also many birds' eggs, including five eggs of the Florida Dusky duck, *Anas fulvigula*, and large numbers of reptiles, among which was a fine series of skulls and skeletons of the soft-shelled turtle, *Platypeltis spinifer*.

Notice was taken in last year's report of an expedition to Venezuela by Capt. Wirt Robinson, U. S. Army, with whom was associated Mr. M. W. Lyon, jr. The collectors succeeded in obtaining a considerable quantity of material, including mammals, birds, reptiles, and insects. The collection was rich in bats and included some beautifully preserved reptiles, among which were two new species of snakes, *Pseudoboa robinsoni* and *Phrynomacis lyoni*.

In the spring of 1901, Prof. J. B. Steere was authorized to make collections of characteristic reptiles and fish of the Amazon River for exhibition at the Pan-American Exposition. He was successful in this work, and obtained also a fine adult skeleton of the Amazon porpoise, *Inia amazonica*, some interesting wasps' nests, and other objects.

The mammal collection from southern Europe obtained by Mr. Dane Coolidge, already mentioned, included what is probably the best series of Italian rodents now in existence. The collection of mammals made by Mr. G. S. Miller, jr., in Madison County, New York, contains about 200 specimens.

The Museum had the good fortune to obtain from Mrs. E. D. Cope, by purchase, a specimen of the extinct Philip Island parrot, *Nestor productus*. There are now two specimens of this bird in the Museum. Only about twelve specimens are known to be preserved.

In the middle of the year the Museum purchased the private collection of Mr. Robert Ridgway, containing about 1,100 North and Central American birds, including many in the first plumages, and all exceedingly perfect specimens. There were no duplicates in the collections.

The type of a supposed new Mountain Chickadee, *Parus gambeli thayeri*, was presented by the late F. J. Birtwell.

Mr. C. B. Kloss presented a representative series of 56 birds from Singapore Island, Malay Peninsula. Capt. H. C. Benson, U. S. Army, presented an excellent collection of nests and eggs of Philippine birds, accompanied in the majority of cases by specimens of the birds. A pair of the rare Stitch birds of New Zealand was purchased; also six skins of the imperial parrot of Dominica Island, West Indies; and four Birds of Paradise, including the rare *Pteridophora alberti*, a species

with extraordinary plumes. The last mentioned is exhibited in the children's room.

Dr. William L. Ralph continued his generous donation of rare birds' eggs, included among which were eggs of the Everglade kite and Henslow's sparrow. Some small collections of eggs from the western United States and Mexico, received from the Biological Survey, Department of Agriculture, were extremely rich in rarities.

The naturalist of the United States Fish Commission Steamer *Albatross* obtained for the Museum a collection of 55 reptiles from the Polynesian Islands during the recent cruise of the vessel in the South Seas, a welcome addition to the scant collections from that part of the world. Thirty-seven reptiles from the island of St. Kitts, West Indies, were presented by Mr. W. H. Alexander, United States weather observer.

The types of the new species of fish collected by the *Fish Hawk* expedition of 1899, to Porto Rico, were deposited in the Museum by the United States Fish Commission, together with other specimens from that island.

Dr. O. P. Jenkins, of Leland Stanford Junior University, presented the type of Hawaiian fishes collected in the islands by himself and Mr. T. D. Wood. The university also presented a series of Japanese fishes.

Regarding important accessions of mollusks, Mr. William H. Dall, honorary curator, writes as follows:

Scientifically the most interesting lot of material received was from Dr. W. Eastlake, of Tokyo, Japan (through Mr. H. E. Moore, of the Fish Commission), comprising about 500 species of oriental shells, a department in which we are exceptionally weak and which this donation materially assisted.

Next, perhaps, comes the collection made by Mr. J. B. Henderson, jr., and Mr. Simpson, in Haiti and Jamaica, comprising over 200 species and 3,000 specimens, which have not been fully administered upon, but which will add valuable and needed material to the collection.

A collection of Naiades from South and Central America, sent by Dr. H. von Ihering and comprising some 225 species, has proved especially valuable, filling many gaps.

A collection of Australian shells, sent in exchange by the Australian Museum, is among the more noteworthy additions.

Other accessions worthy of special mention are those from the Malay Peninsula and adjacent islands, sent by Dr. W. L. Abbott; the collections made in Mexico and Yucatan by Mr. E. W. Nelson, of the Department of Agriculture, and a small collection from the vicinity of Pernambuco, Brazil, received from Dr. J. C. Branner.

The accessions of insects are so numerous, amounting to 297, comprising 37,000 specimens, that it is impossible to mention even the more important ones in detail in this place. Preeminent among them, however, was the Hofmann collection of European Lepidoptera. This collection was formed by the late Dr. O. Hofmann, and was purchased by the Museum from Prof. A. R. Grote, of Hildesheim, Germany.

It contains 15,626 specimens, a splendid series of European Lepidoptera, particularly rich in the smaller moths.

Other important accessions may be summarized as follows: From the Philippine Islands, several accessions of insects of all orders, presented by Dr. P. L. Stangl, U. S. Army, and 100 butterflies, presented by Mr. Samuel H. Adams; from Porto Rico, 30 dragon flies, presented by Mr. G. N. Collins, United States Department of Agriculture; from the Hawaiian Islands, 258 Hymenoptera, donated by the committee for investigating the fauna and flora of these islands (through Dr. David Sharpe), 3 lots given by Mr. H. W. Henshaw, together with the large series collected by Mr. William H. Ashmead; from Cuba were received the collections made by Messrs. Palmer and Riley of the Museum; from New Mexico, several lots of insects of all orders, including types of bees, presented by Prof. T. D. A. Cockerell; from Utah, 5 vials containing types of Lithobiidae, presented by Mr. Ralph V. Chamberlain; from Paraguay, 1,665 butterflies and moths, together with other insects, were purchased; from the Galapagos Islands, 216 Diptera, presented by Mr. Robert E. Snodgrass; from Venezuela, 174 insects, collected by Dr. M. J. Lyon; from South Africa, 63 Diptera, representing 27 species, from C. P. Lounsbury, Government entomologist, Capetown; from the Malay Peninsula and the Natuna Islands, 3 lots of insects, collected by Dr. W. L. Abbott; from Australia, a collection of parasitic Hymenoptera, presented by the department of mines and agriculture, Sydney; from Germany, 545 Diptera and 48 galls of *Hormomyia fagi*, presented by Mr. Theo. Pergande.

In addition should be mentioned the following: Six thousand Mexican diptera from Prof. C. H. T. Townsend; a collection of 396 Diptera, comprising 92 species, received in exchange from the Museum für Naturkunde, Berlin, and 141 Diptera, presented by Mr. C. W. Johnson; 400 moths, presented by Dr. William Barnes; 15 types of Chambers's Tineidae, presented by the Laville University; 202 moths, presented by Dr. Ottolengui; 5 types and 1 cotype of species of Noctuidae, presented by Prof. John B. Smith; 50 moths and 4 types, presented by Dr. James Fletcher; 100 living cocoons of *Monema flavescens* and 100 moths, presented by Mr. A. E. Wileman; a collection of Mutillidae and Formicidae received in exchange from Ernest André, esq., Gray, France; 38 Orthoptera, together with some types and cotypes, presented by W. S. Blatchley through the United States Department of Agriculture; 22 rare Hydroecia, presented by Mr. Henry Bird; types of Jassidae, presented by Prof. Herbert Osborn, Ohio State University.

The United States Fish Commission transferred to the Museum six important collections of marine invertebrates, as follows:

(1) The ophiurans of the "Agassiz" cruise of the *Albatross*, 1891, to the Galapagos Islands, west coast of Mexico, etc., and determined by Drs. Lutken and Mortensen.

(2) Japanese Crustacea collected by the *Albatross*, 1900. These comprise specimens dredged in various depths as well as those collected along shore by Dr. H. F. Moore, naturalist of the *Albatross*.

(3) Corals from the *Albatross* South Sea expedition, 1899-1900; to be studied and reported upon by Mr. T. Wayland Vaughan.

(4) Corals collected in Porto Rican waters by the *Fish Hawk*, 1899. Determined by Mr. Vaughan and results to be published in bulletin of the United States Fish Commission.

(5) Large collection of crayfishes collected in West Virginia, 1899, by a field party of the Fish Commission. Determined by Mr. W. P. Hay.

(6) Arctic crustaceans and echinoderms collected by the Princeton University expedition, 1899. These species were named when received.

Other collections of lower invertebrates which should be mentioned in this place are the types of the oligocheate worms (Enchytraidae) collected by the Harriman Alaska expedition and presented through Dr. C. Hart Merriam; the types of *Cambarus gallinus* presented by Prof. Theodore D. A. Cockerell; a collection of marine and fresh-water crustaceans from the Hawaiian Islands, presented by Mr. H. W. Henshaw; Philippine corals and sponges, received in exchange from Father José Algué; specimens of ocean bottom obtained in connection with the Pacific cable survey made by the U. S. S. *Albatross*, and transmitted by the Hydrographic Office, U. S. Navy.

A very important accession of the year was the Willey lichen herbarium, comprising 10,000 specimens from all parts of the world, constituting the entire private collection of the late Henry Willey, a well-known specialist in this group of plants. The collection was purchased by the Museum from the estate.

Other important accessions of plants, which were chiefly from the Southern United States and Mexico, are as follows: From West Virginia, 468 specimens, collected by Mr. E. L. Morris and received through the United States Fish Commission; from North Carolina, 200 specimens, collected by Mr. C. L. Pollard, of the Museum; from Alabama, Georgia, and Tennessee, 1,600 plants, collected by Messrs. Pollard and Maxon, of the Museum staff; from Louisiana, 144 specimens, presented by Mr. C. R. Ball, United States Department of Agriculture; from Oregon, 5,400 plants, collected by Mr. E. P. Sheldon and received through the United States Department of Agriculture; from Utah, 126 specimens, received in exchange; from Alaska, 174 specimens, presented by Mrs. J. B. Flett, and 248 specimens received in exchange from the New York Botanical Garden; also 100 specimens of arborescent plants, from various localities in the United States, presented by Prof. C. S. Sargent; and 887 specimens from various localities in the United States and Mexico and Central America, received in exchange from the Gray Herbarium.

^aThis is the first species of crayfish known from New Mexico.

The following were the principal purchases of plants made during the year: 917 specimens from Georgia, 1,293 specimens from Florida and Mississippi, 670 specimens from Missouri, 295 specimens from New Mexico, 268 specimens from Mexico, and 100 specimens (Algæ) from various localities in the United States.

WORK ON THE STUDY COLLECTIONS.

In the Division of Mammals the work of renovating skins in danger of destruction on account of their greasy condition or otherwise was continued, special attention being paid to the medium-sized skins—monkeys, small carnivores, etc. About 600 specimens were treated during the year.

The collections of small mammals are now in good condition and for the most part well arranged. The collections of large skins, on the other hand, are still to a great extent in bad or even dangerous condition, due to lack of cases, room, and taxidermic assistance. The specimens in cases are overcrowded, and hundreds have remained for several years without cases, exposed to dust and vermin. Still others are in vats containing preservatives, where they have remained for a number of years.

Considerable work has been done during the year in rearranging the large skulls, a commodious storage space having been provided behind the large wall case on the east side of the South Hall.

A considerable number of worthless mammal skins which had accumulated were brought together, passed upon by a committee of inspection, and condemned.

In order to make room for headquarters for the Department, the mammal collections of the Biological Survey, Department of Agriculture, formerly in the south entrance of the Museum building, were transferred to the north balcony. Some 3,000 small mammal skulls belonging to the collection of the Survey were cleaned during the year, a platform was built on the cases containing the collections in the southeast range, and 12 new unit cases were constructed.

In the Division of Birds little work was done on the cabinet collections. The assistant curator was alone, and being fully occupied by the preparations for the Pan-American Exposition and the installation of the children's room, he found little time to devote to other than routine work, such as answering correspondence, recording specimens, attending to accessions, loans, etc. Toward the end of the year, however, 18 new half-unit cases were placed in the West basement, and a beginning made in transferring the birds from the old and imperfect cases previously used and arranging them in systematic order. The collections of birds' eggs are in excellent condition, but the nests are not properly housed, being still in cases not dust proof. The dupli-

cate eggs were overhauled during the year and a considerable amount of worthless material discarded.

In the Division of Reptiles the old trays containing the study collections were replaced at the beginning of the year by a new system of shelving, doubling the storage capacity of the laboratory. The shelves are movable and provided with simple runners, so that they can be raised or lowered with the greatest ease and without loss of time. A rearrangement of the collections could not be undertaken during the year, as the electric lighting of the laboratory was not completed. The clerk of this division, the only assistant of the curator, was ill for a considerable part of the year, and finally died.

The collections of fishes were thoroughly overhauled and provided with new alcohol. Red labels were furnished for the type specimens received during the year, and a considerable part of the regular series relabeled.

One of the principal operations of the Division of Mollusks was a thorough revision of the Lucinacea, the larger portion of which was relabeled in accordance with the revised classification of the group. The new accessions of the year were labeled and distributed to their proper places in the collection.

The sets of lower marine invertebrates prepared for distribution to educational institutions having been exhausted, a new series of 100 sets was prepared during the year. Each set contains about 300 specimens, representing from 85 to 95 species. Ten special sets of duplicate specimens were also made up and distributed to museums and kindred institutions and 12 lots sent out for exchange purposes. Accessions of the year were cared for as soon as received, and the greater part of the crustaceans named, but for the lack of clerical assistance it was impossible to catalogue specimens as fast as received.

The ophiurans received from the Agassiz *Albatross* expedition of 1891, and determined by Drs. Lutken and Mortensen, were catalogued and the duplicates divided into seven sets and distributed to seven of the principal museums in Europe and America.

In the Division of Insects the work on the general collections is reported upon by Dr. L. O. Howard, honorary curator, as follows:

The collections are probably as well cared for as the room at our disposal, the help available, and the number of insect drawers obtainable will permit.

The Lepidoptera are well arranged in the standard insect drawers, and the large and valuable Hofmann collection of European moths has been incorporated. A card catalogue of species of the entire collection of Lepidoptera has been prepared and greatly facilitates the quick finding of specimens.

The collection of sawflies and part of the ichneumon flies have been transferred to these same drawers and Mr. Schwarz has superintended the transfer of the North American Cerauridae to them, the Hubbard and Schwarz collection in this family being at the same time incorporated with the regular museum series. A rearrangement of some of the exotic collections of Coleoptera has also been made.

Dr. Dyar has spent much time in the identification and arrangement of exotic material, being assisted, particularly in the mounting and labeling of new material, by Mr. A. N. Caudell, of the Department of Agriculture, Division of Entomology.

Mr. Coquillett has done much work on the Diptera, Mr. Ashmead on the Hymenoptera, and Mr. Schwarz, as far as his impaired health would permit, on the Coleoptera.

Mr. Currie has worked on the Odonata and Myrmeleonidae, having named most of the North American insects in these groups and mounted and labeled a good series for the systematic collection. Lack of room, however, has prevented their permanent arrangement, most of the available space and drawers being taken up by the Orthoptera.

The exotic and duplicate Coleoptera and the Arachnida and Myriapoda have been removed to the east-south range gallery. Mr. Banks has rearranged much of the Arachnida and has transferred the vials containing the Marx collection and the regular collection to museum jars filled with alcohol, thus avoiding the danger of the material drying up.

Work has also been done by Professor Cook on the Myriapoda and by Mr. Heide-
mann on the Hemiptera-Heteroptera.

Mr. F. V. Coville, honorary curator, Division of Plants, furnishes the following report on the progress of work in the herbarium:

In the last annual report a description of the new insect-proof case was given, and reference was made to the installation of 80 of these on the floor of the gallery over the southern range. In accordance with the plan of gradual replacement outlined at that time, 14 of these cases have recently been set up along the west wall of the main balcony, and 30 additional ones will shortly be installed on the exhibition balcony. It has been found that these cases, with their double doors, are well adapted to the bisulphide treatment at any time, and that insect pests, when eradicated, may be kept in control by a liberal use of naphthaline in the cases.

The systematic stamping of the sheets in the herbarium has been temporarily discontinued on account of the insufficiency of our force. All sheets of specimens, however, which are loaned for study to persons outside of the Museum are stamped and recorded before transmission, so that in this way the numbering of the herbarium is slowly progressing.

During the last few months the work of rearranging the herbarium according to the sequence established by Engler and Prantl in "Die Natürlichen Pflanzenfamilien" has progressed satisfactorily, the "Index Generum Phanerogamorum" of De Dalla Torre and Harms being taken as a guide. The ferns and fern allies, gymnosperms and monocotyledons, are now arranged on the modern sequence.

Owing to the resignation of one of our three preparators on January 15, 1901, the work of mounting was greatly delayed, and the services of three temporary preparators were secured by requisitions drawn for the purpose in April of the present year. One has assisted Mr. Maxon in labeling and mounting the lichens of the Willey collection; another has mounted miscellaneous plants, and the third has repaired such sheets in the main herbarium as were found to be impaired by the attacks of insect pests. The total number of specimens mounted during the year, exclusive of the cryptogams, is 18,177. Owing to the fact that many of the latter are mounted on a single sheet it is not possible to make even an approximate estimate of their number, but the collections of mosses and lichens, in particular, have been carefully labeled and all accumulations of material mounted. Our catalogue books show a total of 24,647 mounted sheets that have been stamped and recorded during the year. The great majority of these have been distributed into the general herbarium.

Mr. Roland M. Harper was engaged by contract to determine and label the large collection of plants transmitted by the Fish Commission, to which reference is made in another part of this report.

The alcoholics and rough skeletons belonging in the Division of Comparative Anatomy, which are necessarily kept in one of the annexes at present, were rearranged and put in order during the year, and 1,100 skulls of mammals, many of them of large size, were cleaned and added to the reserve series.

SCIENTIFIC RESEARCHES AND PUBLICATIONS.

The activity of the scientific staff in research was one of the most prominent and gratifying features of the year's work, and the large amount of important results published is shown by the Bibliography (Appendix IV).

The systematic manual of the birds of North and Middle America, by Mr. Robert Ridgway, of which mention was made in last year's report, progressed favorably in spite of serious interruptions, and the first volume was put in type. The second volume is nearly ready for the printer. It is expected that the work will be complete in seven volumes. After careful consideration of all the circumstances in the case, it was decided to recast the measurements of specimens, which had been prepared for the first volume in English inches, into metric measurements, and this system will be followed throughout the work. Mr. Ridgway also prepared a paper on a new species and genera of tanagers and orioles.

Dr. Charles W. Richmond continued work on a card catalogue of genera and species of fossil and recent birds, and also published three papers relating to the nomenclature of birds. The work of completing Bendire's "Life Histories of North American Birds" (Special Bulletins, U. S. National Museum, Nos. 1 and 3) was taken up by Dr. W. L. Ralph, honorary curator of the Section of Birds' Eggs, and in that connection a circular letter was issued to those interested in collecting information. A gratifying number of responses has been received from correspondents and friends of the Institution.

Mr. G. S. Miller, jr., published twenty papers on mammals during the year, chiefly noticing new forms in the East Indian collections of Dr. W. L. Abbott, new European, African, and South American mammals. Included among them, however, were a revision of the Red-backed mice of Europe and a key to the land mammals of eastern North America. Mr. M. W. Lyon, jr., published a study of the osteology of the jerboas and jumping mice.

Papers on the reptiles of Japan and of Porto Rico were nearly completed by Dr. L. Stejneger during the year. A large series of outline illustrations for the former was prepared. Dr. Stejneger also began a study of the reptiles of Cuba, and illustrations for a paper on that subject were prepared. In addition he reported on the reptiles collected by Messrs. Robinson and Lyon in Venezuela and published two papers on the birds known as Wheatears (genus *Saxicola*).

The synopses of the Molluscan families Tellinidae and Cardiidae by Mr. William H. Dall, mentioned in the previous report, were published during the year, together with a synopsis of the Lucinacea, the fifth part of a treatise on the Tertiary mollusks of Florida, eleven other shorter papers on mollusks, and several articles of a general character. In conjunction with Mr. Charles T. Simpson he prepared a report on the mollusks collected by the U. S. Fish Commission steamer *Fish Hawk* in Porto Rico. Mr. Simpson also published three papers on river mussels and continued his studies of the naiades with the view of publishing a monograph at some time in the future. Mr. P. Bartsch continued studies on the Pacific Pyramidellidae, and published various short natural history papers in the "Osprey," of which he is associate editor.

In the Division of Marine Invertebrates, Dr. J. E. Benedict continued his studies of the crustaceans of the family Galatheidæ and prepared a report on the anomuran crustaceans of the Fish Commission expedition of 1899 to Porto Rico and a description of four new species of symmetrical pagurid crustaceans. He also published a paper on the hermit crab, *Pagurus bernhardus*, and its allies.

Miss M. J. Rathbun published a synopsis of the grapsoid crabs of North America and a report on the decapod and stomatopod crustaceans collected during the Branner-Agassiz expedition to Brazil. She has also completed keys to the various groups of North American crabs besides the grapsoids, a report of the brachyuran and macruran crustaceans collected during the Stanford University expedition to the Galapagos Islands in 1898-99; a report on crustaceans of the same groups collected in Porto Rican waters in 1899 by the U. S. Fish Commission steamer *Fish Hawk*. In reporting on the decapod crustaceans collected by the Harriman expedition in 1899, Miss Rathbun has undertaken a review of the Decapoda of the west coast of North America, making in that connection a study of the vast number of *Macrura* in the Museum collected in years past by the naturalists of the steamer *Albatross* and by Mr. William H. Dall and others.

Miss Harriet Richardson prepared a report on the isopods of the Stanford University expedition and published a report on the isopods of the Branner-Agassiz expedition and a key to the isopods of the east coast of North America.

Regarding scientific researches in the Division of Insects, Dr. L. O. Howard reports as follows:

All the material of the Harriman expedition has been worked up, and reports upon the same are being published in the Proceedings of the Washington Academy of Sciences. Mr. Coquillett reported upon the Diptera, Mr. Kincaid upon the Tenthredinoidea, Sphegoidea, Vespoidea, and metamorphoses of Coleoptera, Mr. Schwarz upon the Coleoptera and Psyllidae, Mr. Ashmead upon the Hymenoptera as a whole, Dr. Dyar upon the Lepidoptera (descriptions of the new species being furnished by several specialists), Mr. Caudell upon the Orthoptera, Mr. Justus W. Folsom, of

Champaign, Ill., upon the Thysanura, Mr. Heidemann upon the Hemiptera, Mr. Banks upon the Arachnida and neuropteroid insects, Professor Cook upon the Myriapoda, Mr. Pergande upon the Aphididae and Formicidae, and Mr. Currie upon the Odonata.

During the year Mr. Coquillett has been at work monographing certain families of the Diptera, while Mr. Ashmead has worked upon the Ichneumonoidea and Bombidae and has completed his report upon the Hymenoptera Parasitica of the Hawaiian Islands. His work upon exotic material from Africa, Siam, Japan, Australia, and New Zealand has also been continued.

The various specialists connected with the Division of Insects and the Division of Entomology, in the Department of Agriculture, have identified material from the Galapagos Islands collected by Mr. R. E. Snodgrass, and reports upon the same will soon be published as follows: Mr. Banks upon the Arachnida, Mr. Ashmead upon the Hymenoptera, Mr. Coquillett upon the Diptera, Dr. Dyar upon the Lepidoptera, Mr. Currie upon the Odonata, and Mr. Heidemann upon the Hemiptera.

Mr. Currie has continued his work upon the Myrmeleionidae, and is preparing a synonymical card catalogue of the North American neuropteroid insects which, together with catalogues of the North American insects in other orders, it is proposed to publish for the Museum. Much work has also been done on catalogues of Lepidoptera by Dr. Dyar, and Hymenoptera by Mr. Ashmead.

Mr. Caudell has published a synopsis of the hemipterous genus *Sinea*, and has identified considerable material in the Orthoptera.

The bibliography of the division shows 78 titles of papers on insects by members of the staff published during the year. The honorary curator, Dr. L. O. Howard, also published a popular book on habits and classification of mosquitoes.

Mr. F. A. Lucas prosecuted studies on flightless birds and on the osteology of the Tile-fish and its allies.

In the Division of Plants Mr. F. V. Coville published five botanical papers during the year. Mr. Rose (with Prof. J. M. Coulter) published a monograph of the North American Umbelliferae, and has continued his studies of the flora of Mexico, with the view of ultimately publishing an extensive work on that subject. Mr. Pollard continued his studies of the violets, and published a description of a new *Helianthus*, and a series of popular articles on the families of flowering plants. Mr. William R. Maxon continued studies of the ferns and their allies and published a list of these plants growing in North America and eight other papers relating to them.

LOAN OF SPECIMENS.

The practice of lending collections to investigators for study continued as in previous years. While it is impossible in this place to notice all these transactions in detail, mention will be made of the more important instances.

Twenty-eight specimens of Hutia rats (*Capromys*) were lent to Mr. F. M. Chapman, of the American Museum of Natural History, who is engaged in a revision of the genus. Thirty-five bats were lent to Mr. James A. G. Rehn, of the Philadelphia Academy of Natural Sciences.

Mr. Francis J. Birtwell, of Albuquerque, New Mexico, received 60 skins of the Mountain Chickadee, *Parus gambeli*, 50 skins of the Nuthatches, *Sitta carolinensis aculeata* and *mexicana*, and 75 skins of various subspecies of Creepers (*Certhia*) for comparison with New Mexican specimens. To Dr. Jonathan Dwight, jr., were sent 28 skins of *Aegialites* to aid him in determining the status of the subspecies *A. meloda circumcincta*. Mr. Reginald H. Howe, of Brookline, Massachusetts, received 68 skins of *Macrorhamphus* to assist him in determining the relationships of two recognized forms. Messrs. Birtwell and Howe published papers during the year based partly on the material sent them.

The type of the Chimara, *Hariotta raleighana*, and two other fishes of the same species were lent to Dr. Samuel Garman, of the Museum of Comparative Zoology, Cambridge, Massachusetts.

Prof. C. C. Nutting, of Iowa University, received the general collection of hydroids of the families Sertulariidae, Campanulariidae, etc., to be used in the second part of his monograph of the American Hydroids, which forms a Special Bulletin of the National Museum.

The general collection of parasitic copepod crustaceans was placed in the hands of Prof. Charles B. Wilson, of the State Normal School, Westfield, Massachusetts, to be worked up for the benefit of the Museum.

Prof. S. J. Holmes, of the University of Michigan, received the Museum collection of amphipod crustaceans from New England, to be used in the preparation of a report for the United States Fish Commission.

To the general collection of pedate holothurians, now in the hands of Prof. Charles L. Edwards, of Trinity College, were added examples of all the named species in the Museum.

Dr. Wesley R. Coe, of the Sheffield Scientific School, obtained the loan of the nemerteans from the Pacific to assist him in preparing a report on the collection of these animals obtained during the recent cruise of the *Albatross* in the South Pacific.

The general collection of Ostracoda was sent to Prof. R. W. Sharpe, of Dubuque, Iowa, for study.

Twelve lots of the Foraminifera, obtained during the various cruises of the United States Fish Commission steamer *Albatross*, were sent to B. W. Priest, esq., Keeppham, England.

Prof. E. D. Ball, State Agricultural College, Colorado, who is preparing a monograph of the Rhynchota, obtained from the Museum a loan of 402 specimens of insects of that group.

A collection of fleas for monographic work was sent to Prof. Carl F. Baker, of St. Louis, Missouri. Similar loans were made to Prof. E. S. G. Titus, State Agricultural College, Fort Collins, Colorado (332 bees); Prof. J. B. Smith, Rutgers College (192 butterflies); Prof. J. S. Hine,

Ohio State University (71 Mecoptera); Miss M. M. Enteman, University of Chicago (329 specimens of Hymenoptera); Prof. E. B. Williamson, Vanderbilt University (199 dragon flies, genus *Gomphus*); Mr. J. A. G. Rehn, Philadelphia Academy of Sciences (170 Mexican and Central American Orthoptera); Mr. H. C. Toll, Pasadena, California (400 specimens of beetles).

A number of skeletons of birds were loaned to Dr. R. W. Shufeldt for use in connection with his work on the osteology of North American birds.

A total number of 1,736 specimens of plants were lent to various specialists during the year.

DISTRIBUTION OF DUPLICATES.

The demand for zoological material by educational institutions increases every year, but during the year covered by this report no large amount was distributed, for the reason that the sets made up some years ago were practically exhausted. In the case of marine invertebrates, however, as already noted (see p. 73), one hundred new sets, comprising in all about 30,000 specimens, were prepared. Three sets of invertebrates and three of fishes were distributed, containing in all 1,092 specimens. In addition, 10 small special lots of marine invertebrates were also distributed, together with the duplicate ophiurans of the Agassiz *Albatross* expedition of 1891, as already noted (see p. 73).

LABORATORY USE OF COLLECTIONS BY INVESTIGATORS.

As in previous years, the staff of the Biological Survey, Department of Agriculture, made extensive use of the collections for purposes of comparison, and especially mammals and birds.

Mr. Ernest Thompson-Seton spent some days in examining the collection of American deer in connection with a work on the large game of North America which he has in contemplation. Dr. E. A. Mearns, U. S. Army, resumed for a time his work on the zoology of the Mexican boundary survey, and in that connection studied the specimens of American cats in the collection of the Museum. A large series of the birds of Panama was brought to the Division of Birds by Mr. Outram Bangs, and compared with the Museum collections. The committee of the American Ornithologists' Union on nomenclature spent some time in the Division of Birds, as in previous years, in determining the status of various newly-described species and subspecies of birds.

The ichthyologists of the U. S. Fish Commission consulted the collection of fishes.

Prof. L. C. Glenn and Mr. G. C. Martin, of the Maryland Geological Survey, consulted the collections of mollusks on many occasions

in connection with their work on the Maryland Tertiary. Mr. F. N. Balch, of Boston, compared Arctic shells.

Prof. W. P. Hay, of Howard University, continued studies of the crayfish in the collection, and Mr. T. Wayland Vaughan, U. S. Geological Survey, continued work on the West Indian corals.

In the laboratory of the Division of Insects the following investigators spent more or less time during the year: Dr. A. Fenyès, wife, and niece (on Coleoptera); Prof. W. L. Tower, Harvard University (on Coleoptera, particularly Chrysomelidae); Miss M. M. Entemann, Chicago University (wasps of the genus *Polistes*); Prof. J. B. Smith, Rutgers College (various collections, especially Lepidoptera); Mr. J. A. G. Rehn, Philadelphia Academy of Natural Sciences (on Orthoptera); Sir Gilbert Carter, of Nassau, Bahamas (on Lepidoptera).

Prof. E. L. Greene, of the Catholic University, and Mr. E. L. Morris, of the Western High School, Washington, were frequent visitors to the herbarium, the former making general comparisons, the latter continuing his studies on the North American Plantaginaceæ.

Mr. Stewardson Brown and Mr. Joseph Crawford, of the Philadelphia Academy of Natural Sciences, made a brief visit to the herbarium to look up some ancient types. Dr. N. L. Britton, of the New York Botanical Garden, has made several trips to Washington to consult the herbarium in connection with his forthcoming manual. Prof. E. S. Burgess, of the New York Normal College, spent a few days here examining our *Aster* material. Dr. R. H. True, of Harvard University, visited the herbarium and studied specimens of the genus *Dicranum*. A number of officials from the Department of Agriculture made frequent use of the herbarium.

PERSONNEL.

The head curator of the department was appointed representative of the Smithsonian Institution and National Museum on the Government Board for the Pan-American Exposition, Buffalo, N. Y.

Miss Harriet Richardson was appointed collaborator in the Division of Marine Invertebrates, January 11, 1901.

Dr. L. Stejneger was appointed to represent the National Museum at the International Zoological Congress, Berlin, Germany.

Mrs. F. Weinheimer, preparator in the Division of Plants, resigned January 1, 1901.

Mr. Joseph Sessford, clerk in the Division of Reptiles and Batrachians, died March 8, 1901.

Mr. M. W. Lyon, jr., aid, Division of Mammals, was transferred to the U. S. Department of Agriculture on June 1, 1901.

REPORT ON THE DEPARTMENT OF GEOLOGY FOR THE YEAR 1900-1901.

By GEORGE P. MERRILL,
Head Curator.

The year just passed has been a busy one and has been characterized by several changes which, when considered in the aggregate, are of very great importance, placing the department as a whole in a better condition to care for its collections than ever before.

ACCESSIONS.

The more important accessions of the year, including also some of the material which was purchased for exhibition at the Pan-American Exposition, were as follows:

A beautiful nugget of native platinum weighing 444 grams, from the Nijni Tagilsk district, Russia, purchased of Mr. H. M. Lewis for the Pan-American Exposition.

A type series comprising 386 specimens of asphalt and associated rocks, from various parts of the United States, collected by George H. Eldridge and transmitted through the U. S. Geological Survey.

A beautiful series of native silver and copper specimens from Houghton County, Mich., purchased for the Pan-American Exposition.

About 100 pounds of Georgia corundum in masses and crystals, gift of the International Emery Company, of Chester, Massachusetts.

Rocks and ores received from the United States Geological Survey, including those of the Ten Mile District, and Silverton, Pikes Peak, and Cripple Creek quadrangles of Colorado.

A series of zinc ores and associated minerals from Joplin, Missouri, collected by F. W. Crosby, and asphaltum and radiolarian earth from the Barbados, from C. F. Howe.

A series of iron, zinc, and other ores from various parts of Europe, collected by Dr. Heinrich Ries.

Large specimens of mohawkite and domeykite, with native silver from the Wolverine copper mine, Houghton County, Michigan, gift of Fred Smith.

Three samples of beach gold from Cape Nome, Alaska, purchased.

Six nuggets of platinum, weighing $26\frac{1}{2}$ grams, from Trinity County, California, the gift of the Welsbach Company, through W. E. Barrows, president.

A fine large nodule of Oregon priceite, the gift of W. C. Lake.

Twenty-two specimens of minerals from the trap rocks near Trenton, New Jersey, gift of W. A. Roebbling.

Five cut beryls from Topsham, Maine.

Twelve cut turquoise and two cut opals, gift of H. B. Petersen.

Two specimens of pisanite, a mineral new to the collection, received from the United States Geological Survey.

One specimen of reinite, also new to the collection, the gift of T. Kotchibe.

From the United States Geological Survey, 375 specimens of Pre-Cambrian invertebrate fossils, including material figured and described by Dr. Charles D. Walcott in the Bulletin of the Geological Society of America; 2,370 specimens, mainly brachiopods, from the Cambrian; 2,425 Ordovician fossils, being the first collections of considerable value from this horizon, from southern Nevada and near El Paso, Texas; 114 Silurian and 1,550 Devonian specimens, from the Helderbergian and Oriskanian beds of Indian Territory and the higher Devonian of Colorado and New Mexico, a portion of which was described by Mr. G. H. Girty in the Nineteenth Annual Report of the United States Geological Survey, and a very large number of duplicate Miocene and Pliocene mollusca.

In addition to these should be mentioned the collections of Cambrian fossils from Russia, Norway, Sweden, Nova Scotia, and Newfoundland made by Mr. Walcott and his assistants, Messrs. Schmalensee and S. Ward Loper, and extensive Carboniferous, Silurian, and Devonian collections made by Charles Schuchert in New Brunswick, the Gaspé region in Quebec, and in western New York, Maryland, and eastern Pennsylvania.

An excellent series of cephalopod mollusks, purchased from Messrs. Krantz and Sturtz, of Bonn, Prussia.

A fine series of Oriskanian and Helderbergian fossils from near Cumberland, Maryland, obtained by gift and exchange from Messrs. Robert H. Gordon, Frank Hartley, and George W. Perdue.

A remarkably fine slab of the floating erinoid *Uintacrinus socialis*, from the Upper Cretaceous of Logan County, Kansas, gift of Mr. Frank Springer.

The private collection of F. A. Randall, of Warren, Pennsylvania, containing upward of 3,600 specimens of Upper Devonian and Lower Carboniferous fossils, obtained by purchase.

The greater portion of the skeleton of the gigantic toothed diver, *Hesperornis regalis*, from Logan County, Kansas, purchased for the Pan-American Exposition.

A series of Moa bones, obtained by exchange from Capt. F. W. Hutton, of Christ Church, New Zealand.

A nearly complete though composite skeleton of the New Zealand *Emeus crassus*, obtained by purchase.

A skull of *Elotherium* and other vertebrate fossils from the Bad Lands of Dakota, gift of Dr. J. R. Walker, of the Pine Ridge Agency.

A fairly complete skeleton of an adult female mastodon, obtained by purchase and excavating, from near Church, Michigan.

One hundred and fifty Carboniferous and Permian fossil plants from Kansas, received in exchange from the University of Kansas, through Mr. E. H. Sellards, of Lawrence, Kansas.

One hundred and seventy-three fossil plants of the Middle and Upper Oligocene, Middle and Upper Miocene, and Upper Pliocene of Germany, received in exchange from the Museum Senckenberg National Scientific Society, of Frankfort, through Dr. F. Kinkel, of Frankfort-on-Main, Germany.

Thirty-three fossil plants from the Triassic of York County, Pennsylvania, received in exchange from Prof. A. Wanner, superintendent of public instruction, of York, Pennsylvania.

One hundred and twenty-five specimens of fossil plants from Fern Ledges, St. John, New Brunswick—the W. J. Wilson collection—gift of Mr. R. D. Lacoe.

Sixty-eight specimens of Devonian and sub-Carboniferous fossil plants, part of the collection purchased from F. A. Randall, of Warren, Pennsylvania.

The meteorite collection has been increased by purchase and exchange more than during any previous period of like duration within the history of the Museum. The most important accession was a stony meteorite which fell near Felix, Alabama, in May, 1900, and which was obtained for the Museum mainly through the efforts of Mr. Coleman. This stone, weighing 2,049 grams, is of more than ordinary interest and has been made the subject of special study. In addition, there were obtained by purchase a fine slab weighing 4,420 grams of the Sacramento iron; a 38-gram fragment of the Agen stone, which fell in 1814; a 31-gram fragment of the Zavid stone, which fell in August, 1897, and 490 grams of a stony meteorite from Ness County, Kansas. By exchange there were obtained a 3,103-gram piece of the second-find Fayette County stone; a 98-gram piece of the celebrated Carbonaceous Orgueil stone, which fell in 1864; 620 grams of the Bjurbole stone of 1899; 10 grams of the Lancé stone of 1872, and 45 grams of the Misshof stone of 1890.

SOURCES OF NEW MATERIAL.

As in years past, the U. S. Geological Survey has been the principal contributor to the collection, though, as noted above, several valuable specimens have been obtained by purchase and exchange.

In August, 1900, Mr. Frederic A. Lucas, in search of mastodon remains for the Pan-American Exposition, visited several reported finds of bones near Munroe, New York, Kimmswick, Missouri, and Culver, Indiana.

Mr. Stewart, on a similar errand, also visited Kimmiswick and various reported finds in adjacent States; but in none of these cases was material sufficiently perfect for restoration secured, though some interesting portions of skeletons were obtained. The latter part of May Mr. Stewart was sent to investigate a reported find of bones near Church, in southern Michigan, and was fortunate enough to secure a very well preserved skeleton of a female *Mastodon americanus*. It is hoped we may be able to mount this for exhibition some time during the coming year.

Mr. Schuchert spent the month of July and the greater part of August in collecting fossils from the Silurian along the Arisaig coast in Nova Scotia, and from the Lower Devonian near Dalhousie, New Brunswick, and the Gaspé region of eastern Quebec, Canada. In September he passed a few days near Cumberland, Maryland, gathering Silurian and Devonian fossils, and after his work of installation at the Pan-American Exposition in early May, a few days were devoted to collecting Silurian fossils in the cement quarries at North Buffalo and about Lewiston and New Bloomfield, in eastern Pennsylvania. During May and June he was again occupied for nearly four weeks collecting Silurian and Devonian fossils in eastern Pennsylvania and about Cumberland, Maryland. These collections, it may be said, were made with a view to the more accurate fixation of the line separating the Silurian from the Devonian systems in America, a problem upon which Mr. Schuchert has been for some time engaged.

In February Mr. J. W. Coleman was sent to Selma, Alabama, where he obtained the Felix meteorite already referred to, and others have been obtained by exchange. Six polished spheres of pegmatite, onyx, marble, serpentine, spherosiderite, and satin spar have been prepared from material in the reserve series and added to the gem series.

ROUTINE.

In all divisions of the department there were received some 80,000 specimens which required entering in the Museum catalogues, numbering, and, in many instances, the preparation of cards for the card catalogues, and perhaps labels for exhibition purposes as well. In addition there still remains a large amount of old material needing attention. Mrs. Jouy, who has been placed in charge of this line of work, reports that for the Division of Geology and the sections of paleobotany and vertebrate paleontology there have thus been made 7,351 entries in the Museum registers; that between 13,000 and 14,000 catalogue and reference cards, specimen slips, and temporary labels have been prepared, and that 5,383 specimens have been numbered. These numbers are painted in oil on a hard-oil finished background and require four or five figures for each number, involving, all told, therefore, some 25,000 figures.

Mr. Schuchert reports the final installation during the year of 3,278 specimens. In all the divisions there have been prepared and sent to the printer manuscript for 5,626 specimen labels.

The cases in the west-south range containing the volcanic, geyser and hot spring, and rock-weathering series, have been repainted, and the exhibit rearranged. About two-thirds of the building-stone collection in the southwest court has been thoroughly overhauled and cleansed from the dust and dirt that accumulated during the work of the erection of the balconies. The work of labeling the non-metallic series on the balcony of the southwest court has been practically completed.

A large amount of work has been done in the way of cutting, polishing, and otherwise preparing material for exhibition, particularly in the divisions of geology. A 75-pound mass which was cut from the prehistoric Casa Grande meteoric iron has been sawn into slices and cubes, giving thus valuable material for etching, for exhibition, and for exchange.

But little progress has been made in the way of increasing the exhibition series in the section of vertebrate fossils, owing to the employment of the preparators on work for the Pan-American Exposition, to be noted later. A large Plesiosaur skeleton has, however, been placed on exhibition in a special case, as has also a large and fine skull of Triceratops, both of which were received from the Marsh collection.

Dr. Peale, when not occupied with the routine work of his division, has been engaged in the preliminary compilation of a geological section across the United States from the Pacific Ocean to the Atlantic coast. The line upon which this section was made was drawn through those parts of the country where the most geological data were available. The horizontal scale is 2 miles to the inch, as this coincides with a large part of the topographic data available from the records of the United States Geological Survey. The vertical scale of 4,000 feet to the inch was adopted so that the relief might be apparent, especially in those parts of the section where the elevation above sea level is not very great. In order, also, to show the structure of these portions, the section was carried to a line 5,000 feet below sea level. The work of the Geological Survey in California and in the Appalachian region; that of the survey of the fortieth parallel in Nevada, Utah, and Wyoming; of the Hayden survey of Colorado, and that of the Kansas, Missouri, Illinois, Kentucky, and North Carolina State surveys, where the line crosses those States, have been utilized in making this section. The section has been drawn in water color on rough manila paper.

Mr. Newhall, as in years past, has been engaged in the general work of the details of the exhibition and study series of the division of geology.

PAN-AMERICAN EXPOSITION.

The daily routine of the Museum has been greatly retarded by the work of preparing for the Pan-American Exposition at Buffalo. This was begun early in the year, and, although not occupying all of our time and attention, was continued until the opening of the exposition in May. The exhibits prepared by the various divisions of the department consisted of:

A systematic collection of minerals, comprising 735 specimens and occupying five slope-top cases.

Collections illustrating cave deposits, concretionary structures, hot spring and geyser deposits, silicified woods, and the rocks and soils of the Hawaiian Islands, occupying five wall cases.

A small case of native elements.

A systematic collection of invertebrate fossils illustrating the development and classification of the cephalopod mollusks, comprising 450 specimens, and a synoptic collection of crinoids, comprising some 300 specimens.

A mounted skeleton of the gigantic toothed diver, *Hesperornis regalis*, from the Cretaceous of Kansas.

A life-size restoration of the skeleton of the Cretaceous reptile, *Triceratops prorsus*, from the Cretaceous of Wyoming.

A life-size restoration of the skeleton of the Zeuglodon, from the Tertiary beds of Alabama.

The restoration of the Triceratops was accompanied by a small model and painting of the animal as it was supposed to appear in life, the work of Mr. Charles R. Knight. In addition to these, there were two cases of mammoth remains from Indian Territory and Kimmswick, Missouri, collected for the Museum by Mr. Stewart. It had been hoped to include in the exhibit a mounted skeleton of the extinct mastodon, but a sufficiently perfect one was not found until too late for the exposition.

The installation of these exhibits at Buffalo required the presence there of Messrs. Lucas, Schuchert, Stewart, Tassin, and the head curator himself, for periods of from six to ten days, and naturally the ordinary work of the Museum was greatly interrupted thereby.

PRESENT STATE OF THE COLLECTIONS.

The department, as a whole, was never in better condition than it is to-day. All of the halls are open to the public, and with the exception of the sections of paleobotany and vertebrate paleontology the collections are well arranged and quite completely labeled. A great deal, naturally, remains to be done in the way of substituting new material and rounding out the collections. The sections in arrears are those which have been most recently established, and in which, moreover, a great amount of preparatory work is necessary before the

specimens can be placed upon exhibition. It will be some years before they can expect to compare favorably with those which have been longer in existence.

RESEARCH AND PUBLICATION.

The head curator is engaged in investigations upon a series of nepheline-melilite rocks, collected by C. H. Hitchcock in Oahu, Hawaii, and has completed a study of the stony meteorite which fell in Felix, Alabama, in 1900. He has published during the year, in connection with Dr. H. N. Stokes, a paper on a stony meteorite which fell at Allegan, Michigan, in 1899, and an iron meteorite from Mart, Texas. The Guide to the Study of the Collections in the Section of Applied Geology, which was mentioned in the last report as being in the hands of the Government Printer, has been issued, and comprises pages 157 to 483, inclusive, of the Annual Report for 1899.

The transfer of the laboratory from the second to the third floor of the southwest pavilion not merely gives better space for office purposes on the second floor, but enables us to concentrate the work of the geological and mineralogical divisions and make a considerable saving in time and energy as well as expense for material and apparatus. Should Dr. Fireman continue in the department as chemist, we may hope to see an important improvement, both in the quantity and quality of the work done upon the collections. Mr. Tassin is at present engaged in an analysis of a damourite from California, involving the determination of boron, which, it is thought, may have an important bearing upon the establishment of the formula for this mineral. He is also continuing his work on the dehydration of the metallic hydrates, with especial reference to the hydration of ferric and ferrous sulphates and the dehydration of the resultant hydrates and basic salts. The manuscript of a handbook on the Gem Collection, mentioned in my last report as in process of preparation, has been completed and is in the hands of the Government Printer.

Mr. Schuchert has continued his work on a Monograph of American Fossil Starfishes, and hopes to complete Part I of the same during the coming winter. He has also continued his studies relative to the zones separating the Upper Silurian and Lower Devonian faunas in America, and has published a paper on the Helderbergian fossils near Montreal, Canada, in which he gives a corrected list of the fossils found on St. Helens Island. This shows that two distinct faunas are there found, one, the Helderbergian, older than the agglomerate, and another from blocks in the agglomerate, of Middle Devonian age, the Helderbergian fauna being not mixed with the Silurian nor Middle Devonian fossils, as stated by previous workers.

Mr. Lucas has begun the work of preparing the text for the volume on Stegosaurus projected by the late Prof. O. C. Marsh. He has also given some little time to the study of the mastodons of North America.

and published papers on the Lachrymal Bone in Pinnipeds; on the Characters and Relations of Gallinuloides, a Fossil Gallinaceous Bird from the Green River Shales of Wyoming; a Description of Skull of *Lepidosteus atrox*; on a New Rhinoceros, *Trigonias osborni*, from the Miocene of South Dakota; on The Pelvic Girdle of Zeuglodon, *Basilosaurus cetoides* (Owen); on A New Fossil Cyprinoid, *Leuciscus turneri*, from the Miocene of Nevada, and on A New Dinosaur, *Stegosaurus marshi*, from the Lower Cretaceous of South Dakota.

ASSISTANCE TO INDIVIDUALS AND INSTITUTIONS.

As in previous years, a very considerable amount of material^o has been lent for study or sent out as exchanges or as direct gifts to schools and colleges. Among the loans mention may be made of the following:

To Alexander Agassiz, Museum of Comparative Zoology of Harvard University, 28 specimens and 4 thin sections of rocks, from the Galapagos Islands.

To Charles Palache, Harvard University, 28 thin sections of Alaskan rocks.

To H. A. Robinson, Peabody Museum of Yale University, 7 specimens of volcanic rock.

To the United States Geological Survey, specimens of minerals for use in chemical and physical investigations.

To Dr. J. M. Clarke, of the States Museum, Albany, New York, 559 specimens of Oriskany fossils, collected by Mr. Schuchert in the Gaspé region.

To Prof. James Perrin Smith, Leland Stanford Junior University, California, 19 Texas ammonoids from the Carboniferous formation and 77 Triassic ammonoids.

To Dr. O. P. Hay and J. W. Gidley, of the American Museum of Natural History, New York City, material for use in the preparation of papers on the chelonia and the horse.

In the way of exchanges material has been sent out as follows:

To Rev. Mark C. Hayford, Cape Coast, West Africa, 22 specimens of rocks and ores.

To Dr. E. Ordonez, City of Mexico, 6 specimens of eruptive rocks.

To H. S. Washington, Locust, New Jersey, 2 specimens of eruptive rocks.

To L. V. Pirsson, Yale University, 15 specimens of eruptive rocks.

To W. C. Brögger, Christiania, Norway, 79 specimens of eruptive rocks.

To H. A. Ward, Rochester, New York, 2 specimens of meteorites.

To F. W. Hutton, curator of Canterbury Museum, New Zealand, a series of Titanotherium bones and 43 specimens of invertebrates.

Gifts of specimens have been made to schools and colleges, etc., as follows:

To the Louisiana Industrial Institute, of Ruston, Louisiana, 32 specimens of rocks, minerals, ores, and fossils.

To the city school, Monroe, Louisiana, 31 specimens of rocks, minerals, ores, and fossils.

To A. V. S. Cochrane, Hudson, New York, 22 specimens of ores and minerals.

To the University of Idaho, Moscow, Idaho, 28 specimens of rocks and 14 thin sections.

To the Wesleyan Female Seminary at Macon, Georgia, 43 specimens of rocks.

To the Division of Soils, Department of Agriculture, a collection of 302 specimens of minerals.

PLANS FOR THE FUTURE.

A generalized geological section across the entire width of the American continent has been attempted, and a preliminary sketch on a horizontal scale of 2 miles to an inch has been prepared, as already noted. This will give, when finished, a section some 125 feet in length, to accompany the historical series now installed in a temporary case on the south wall of the west-south range. It is hoped that another year will enable us to put this section into permanent form, as well as to replace the temporary case with a new one better adapted to the purpose.

As practically all the available exhibition space for the department is now occupied, further development must be mainly along the lines already laid down. It has long been felt that the section of practical geology could be strengthened by building up certain special exhibits showing the occurrence and association of the ores of some few of the more interesting mining regions. At present this has been attempted only for the zinc and lead regions of southwest Missouri. The work is as yet incomplete.

The growth of the meteorite collection has been such that an entire rearrangement is anticipated. Very many of the smaller specimens will be relegated to the drawer series, and in the space thus gained an attempt will be made to give the others a more attractive setting and more comprehensive labels.

In the section of vertebrate paleontology it is desired to mount for exhibition some of the abundant Dinosaur material, particularly the limbs and pelvis of the *Triceratops* and the entire hind limb of *Morosaurus grandis*, as well as the remarkably fine series of *Titanotherium* skulls. This, with the work of repairing and properly installing material now in the cases, will alone occupy the attention of our present force of preparators for the entire year.

In the section of invertebrate paleontology Mr. Schuchert reports the I. H. Harris collection of Cincinnati fossils as next to receive attention, the available space for exhibition being so nearly occupied that little more can be done in this direction.

In the section of paleobotany Dr. Peale will begin at once with an entire readjustment of the exhibition series and the work of preparing manuscript of the labels for the same.

From the manner in which the Museum collections have been built up, it follows almost as a matter of course that they are unusually rich in type material or material which has been the subject of special study. It is my hope to be able to present with this report a catalogue of such types, in order that their whereabouts may be more widely known and incidentally to enhance their value. In this connection it may be well to call attention to the large collections of unstudied material which have accumulated, particularly in the section of invertebrate paleontology. I would refer more especially to the fossil insects, bryozoa, hydroids, sponges, etc. It is hoped that before many years some arrangement can be made whereby these collections may be worked up by competent specialists.

PERSONNEL.

Several changes in the personnel of the Department have occurred during the year, and the additional assistance afforded has been of great benefit. Miss Lucy M. Graves was appointed as stenographer to succeed Miss Carrie V. Hurlbut, resigned; Mrs. M. S. F. Jouy was promoted to the position of clerk in charge of the records, and Dr. Peter Fireman was given a temporary appointment as chemical geologist. The employment of Mr. C. N. Cruikshank for the purpose of numbering specimens and attending to other miscellaneous work, and of Messrs. J. W. Coleman and Alban Stewart as skilled laborer and preparator, respectively, should also be mentioned.

CONCLUDING REMARKS.

No one but a specialist can fully realize how trying it is to be obliged to lay aside systematic work on the collections or the consideration of the many interesting problems which constantly present themselves, for the work of preparing for the numerous expositions which have been held during the past dozen or twenty years. It has been estimated that an amount of time equal to three months, or one-fourth of the entire year, was given by the head of each division or section to the work of preparing and installing the exhibit now at Buffalo. While recognizing that such work is to be regarded as an essential part of a curator's duties, nevertheless the amount of it that has devolved upon

the department during the past few years is sufficient to test the patience and endurance of the best.

Considerations such as those lead me to once more express my gratification at the willingness always manifested on the part of the departmental staff and the thoroughness with which any work is done which it is believed will advance the interests of the Museum as a whole, regardless of personal considerations.

Through the death of Mr. R. D. Lacroë, which took place on February 5, 1901, the department has met with a severe loss. It is doubtful if any museum ever had a more disinterested friend than he—one who considered himself last of all, and only asked that his collections might be put where they would be of the greatest possible good in advancing the cause of science.

APPENDIX I.

THE MUSEUM STAFF.

[June 30, 1901.]

S. P. Langley, Secretary of the Smithsonian Institution, Keeper Ex-Officio.
Richard Rathbun, Assistant Secretary, in charge of the U. S. National Museum.
Frederick W. True, Executive Curator.

SCIENTIFIC STAFF.

DEPARTMENT OF ANTHROPOLOGY:

W. H. Holmes, Head Curator.

(a) *Division of Ethnology*: O. T. Mason, Curator; Walter Hough, Assistant Curator; J. W. Fewkes, Collaborator.

(b) *Division of Historic Archeology*: Paul Haupt, Honorary Curator; Cyrus Adler, Honorary Assistant Curator; I. M. Casanowicz, Aid.

(c) *Division of Prehistoric Archeology*: Thomas Wilson, Curator.

(d) *Division of Technology* (Mechanical phases): J. E. Watkins, Curator; George C. Maynard, Assistant Curator.

Section of Electricity: G. C. Maynard, Custodian.

(e) *Division of Graphic Arts*:

Section of Photography: T. W. Smillie, Custodian.

(f) *Division of Medicine*: J. M. Flint, U. S. N. (Retired), Honorary Curator.

(g) *Division of Religions*:

Section of Historic Religious Ceremonials; Cyrus Adler, Custodian.

(h) *Division of History and Biography*:

Section of American History, A. H. Clark, Custodian; Paul Beckwith, Aid.

DEPARTMENT OF BIOLOGY:

Frederick W. True, Head Curator.

(a) *Division of Mammals*: Frederick W. True, Acting Curator; G. S. Miller, jr., Assistant Curator; Marcus W. Lyon, jr., Aid.

(b) *Division of Birds*: Robert Ridgway, Curator; Charles W. Richmond, Assistant Curator; J. H. Riley, Aid.

Section of Birds' Eggs: William L. Ralph, Honorary Curator.

(c) *Division of Reptiles and Batrachians*: Leonhard Stejneger, Curator.

(d) *Division of Fishes*: Tarleton H. Bean, Honorary Curator; Barton A. Bean, Assistant Curator.

(e) *Division of Mollusks*: William H. Dall, Honorary Curator; C. T. Simpson, Aid; Paul Bartsch, Aid.

(f) *Division of Insects*: L. O. Howard, Honorary Curator; W. H. Ashmead, Assistant Curator; R. P. Currie, Aid.

Section of Hymenoptera: W. H. Ashmead, in charge.

DEPARTMENT OF BIOLOGY—Continued.

(f) *Division of Insects*—Continued.

Section of Myriapoda: O. F. Cook, Custodian.

Section of Diptera: D. W. Coquillett, Custodian.

Section of Coleoptera: E. A. Schwarz, Custodian.

Section of Lepidoptera: Harrison G. Dyar, Custodian.

Section of Arachnida: Nathan Banks, Custodian.

- (g) *Division of Marine Invertebrates*: Richard Rathbun, Honorary Curator; J. E. Benedict, Assistant Curator; Miss M. J. Rathbun, Assistant Curator; Miss Harriet Richardson, Collaborator.

Section of Helminthological Collections: C. W. Stiles, Custodian.

- (h) *Division of Comparative Anatomy*: Frederic A. Lucas, Curator.

- (i) *Division of Plants (National Herbarium)*: Frederick V. Coville, Honorary Curator; J. N. Rose, Assistant Curator; C. L. Pollard, Assistant Curator; W. R. Maxon, Aid.

Section of Forestry: B. E. Fernow, Honorary Curator.

Section of Cryptogamic Collections: O. F. Cook, Honorary Assistant Curator.

Section of Algae: W. T. Swingle, Custodian.

Section of Lower Fungi: D. G. Fairchild, Custodian.

Associates in Zoology (Honorary): Theodore N. Gill, C. Hart Merriam, R. E. C. Stearns.

DEPARTMENT OF GEOLOGY:

George P. Merrill, Head Curator.

- (a) *Division of Physical and Chemical Geology (Systematic and Applied)*: George P. Merrill, Curator; W. H. Newhall, Aid; Peter Fireman, Chemical Geologist.

- (b) *Division of Mineralogy*: F. W. Clarke, Honorary Curator; Wirt Tassin, Assistant Curator; L. T. Chamberlain, Honorary Custodian of Gems and Precious Stones.

- (c) *Division of Stratigraphic Paleontology*: Charles D. Walcott, Honorary Curator; Charles Schuchert, Assistant Curator.

Section of Vertebrate Fossils: F. A. Lucas, Acting Curator.

Section of Invertebrate Fossils: Paleozoic, Charles Schuchert, Custodian; Carboniferous, George H. Girty, Custodian; Mesozoic, T. W. Stanton, Custodian; Cenozoic, W. H. Dall, Associate Curator.

Section of Paleobotany: Lester F. Ward, Associate Curator; A. C. Peale, Aid; F. H. Knowlton, Custodian of Mesozoic Plants; David White, Custodian of Paleozoic Plants.

Associate in Paleontology (Honorary): Charles A. White.

ADMINISTRATIVE STAFF.

Chief Clerk, W. V. Cox.

Chief of Buildings and Superintendence, J. E. Watkins.

Chief of Correspondence and Documents, R. I. Geare.

Photographer, T. W. Smillie.

Registrar, S. C. Brown.

Disbursing Clerk, W. W. Karr.

Property Clerk, W. A. Knowles (Acting).

Librarian, Cyrus Adler.

Assistant Librarian, N. P. Seudder.

Editor, Marcus Benjamin.

APPENDIX II.

LIST OF ACCESSIONS.

- ABBOTT, Dr. W. L., Singapore, Straits Settlements: Natural history specimens and ethnological objects from the Mergui Peninsula and localities in the Malay Archipelago, Natunas, Tringanu, and Tioman Island (37007, 37335, 37409). (See under Kloss, C. B.)
- ABEL, J. C., Lancaster, Pa.: Stone implements and arrow points found on the Conestoga Hills, near Lancaster. 37411.
- ADAIR, I. J., Warren, Ark.: Wheel bug, *Prionidus cristatus*. 36815.
- ADAMS, C. E., San Juan, Porto Rico: Three specimens of blind lizards (*Amphishbena*). 36803.
- ADAMS, C. F., Kansas City, Mo.: Six specimens of Diptera. 37618.
- ADAMS, HENRY. (See under Smithsonian Institution.)
- ADAMS, SAMUEL H., Department of Agriculture, Washington, D. C.: Received through Dr. L. O. Howard. One hundred butterflies from the Philippine Islands. 37713.
- ADLER, Dr. CYRUS, Smithsonian Institution: Photograph of a synagogue in Gibraltar. 37373.
- AFFELD, C. E., Biloxi, Miss.: Plant. 37624.
- AGRICULTURE, DEPARTMENT OF.—Hon. James Wilson, Secretary:
Four crabs from Mexico representing 2 species (36809); received from Dr. L. O. Howard, anklet made from a monkey skin and cocoons of the "Queen Moth," *Argema mimosae* Boisduval (36991); 61 specimens of dragon flies from North America containing many rare species and constituting a portion of the collection of the late Prof. F. L. Harvey (37059);
- AGRICULTURE, DEPARTMENT OF.—Cont'd.
received through Biological Survey, land and fresh-watershells from Mexico, collected by E. W. Nelson (37096); 6 Hippas from Yucatan, collected by Messrs. E. W. Nelson and E. A. Goldman (37718); geological specimens (37726); 2,082 specimens, representing 1,105 species of Hemiptera-heteroptera (37873); crabs from Yucatan, collected by Messrs. Nelson and Goldman (37915).
- Material deposited in the National Herbarium:* Specimen of *Styrax plantanifolia*, collected by Charles Hupperty, Austin, Tex. (36772); plant from California, collected by E. R. Emery (36812); 7 plants collected by L. H. Dewey in the United States (36898); 18 plants collected by Lieut. B. H. Dutcher, Fort Grant, Ariz. (36907); 118 plants collected by E. Taylor in Iceland (37031); 5,400 plants collected in Oregon by E. P. Sheldon (37166); 24 plants collected in Alaska by Lieut. J. S. Herron (37191); plant collected by L. H. Dewey (37275); 15 plants from Texas collected by Vernon Bailey (37310); 22 plants from Oregon collected by F. V. Coville (37382); specimen of *Marsilia* from Louisiana (37402); 21 plants collected by Mr. Coville (37398); 8 plants from California collected by J. M. Hutchens and Vernon Bailey (37448); 183 plants collected in Montana by V. K. Chestnut and T. E. Wilcox (37454); 42 plants from Alaska and British Columbia, collected by N. H. Osgood (37472); 78 plants from the Hudson Bay region collected by E. A. Preble (37473); 10 plants from Luzon, Philippine Islands

AGRICULTURE, DEPARTMENT OF—Cont'd.

(37573); 14 plants collected in Montana by T. E. Wilcox (37579); 52 plants from the Yellowstone National Park, collected by Elmer D. Merrill (37600); 140 plants collected in Oregon by F. V. Coville (37679); 73 plants from Alaska collected by Arthur J. Collier (37752); 56 plants from Oregon collected by E. I. Applegate (37836); 2 plants from the British Museum, London, England (37870); plant collected in the District of Columbia by Dr. A. K. Fisher (37909); 211 plants collected in Alaska by A. L. Bolton (37960); 22 plants collected by C. C. Georgeson in Alaska (37984); 21 plants collected in Arizona by Gifford Pinchot (37985); plant from New Mexico collected by Prof. T. D. A. Cockerell and W. P. Cockerell (37986); plant from Texas collected by E. N. Plank (37987); 64 plants collected in Canada by E. A. and A. E. Preble (37988); 3 plants collected in North Carolina by W. W. Ashe (38000); plant collected in Oregon by E. I. Applegate (38001); plant collected in New Jersey by Miss A. D. Weeks (38032); specimens of *Negundo* from New Jersey collected by Miss B. Durgin (38033); 3 plants from New York collected by M. L. Overacker (38060); plant from Europe collected by M. J. Ball (38070); 17 plants from Alaska collected by M. F. E. Blaisdell (38071); 2 plants from Wyoming collected by Aven Nelson (38072); 168 plants from Idaho collected by E. D. Merrill (38073); plant from the District of Columbia collected by A. G. Masius (38110); plant from Virginia collected by Harry J. Kirk (38111); plant from Alaska collected by Dr. L. Stejneger (38112); plants from Montana collected by H. B. Ayres (38113).

(See under Anderson, J. R.; Armstrong, George; Barnett, J. M.; Beal, W. J.; Brandegee, T. S.; Cole, Miss E. J.; Collins, G. N.; Finley, J. B.; Fisher, Dr. A. K.; Haberer, Dr. J. V.; Harward, Miss Winnie; Hasse, Dr. H. E.; Hay, W. P.; Herrera,

AGRICULTURE, DEPARTMENT OF—Cont'd.

Prof. A. L.; Hindman, Albert; Holzinger, J. M.; Langille, H. D.; Melton, T. A.; Millspaugh, Dr. C. F.; Nolan, W. J.; O'Neill, J. A.; Pitcher, James R.; Preble, A. E.; Preble, E. A.; Sheldon, E. P.; Shrader, F. C.; Steele, W. C.; Sydney, New South Wales, Botanic Gardens; Tracy, S. M.; Trask, Mrs. Blanche; War Department; Wells, H. C.; Whited, Kirk; Wilkinson, E. B.; Wooddell, G. P.; Wooton, E. O.)

AGUILERA, JOSÉ G. (See under Mexico, Mexico, Instituto Geológico de Mexico.)

AKIN, LAPHA, Sparksville, Ky.: Specimens of scolytid beetles. 38131.

ALABAMA BIOLOGICAL SURVEY, Auburn, Ala.: One hundred plants. Exchange. 38144.

ALDRICH, Prof. J. M., University of Idaho, Moscow, Idaho: Woodchuck (*Arctomys*). 37804.

ALDRICH, Hon. T. H., Birmingham, Ala.: Eight species of Unionidae from the Southern States (36792); Unionidae from various localities (37173).

ALEXANDER, R. M., Kansas City, Mo.: Twenty spearheads, 15 arrow points, and a hematite celt. Exchange. 37444.

ALEXANDER, W. H., Basseterre, St. Kitts, British West Indies: Bats, reptiles, insects, and birds, in alcohol, from the West Indies. 38105.

ALGUÉ, Father José, Director of the Observatory, Manila, Philippine Islands: Mollusks, corals, and sponge from the Philippine Islands. Exchange. 37445.

ALTOFF, Mrs. J., Washington, D. C.: Canadian two-dollar note. Purchase. 37261.

AMERICAN MUSEUM OF NATURAL HISTORY, New York City: Ten plaster casts of implements and carvings of stone and bone from British Columbia (36864); received through Dr. Franz Boas, 3 suits of Eskimo clothing (37404). Exchange.

AMI, Dr. H. M. (See under Ottawa, Canada, Geological Survey of.)

- ANDERSON, Edith, Highland, N. C.: Specimen of *Kalmia*. 36978.
- ANDERSON, F. M., Berkeley, Cal.: Twenty-seven specimens (7 species) of Cretaceous (Lower Chico) ammonites from near Phoenix, Ariz. Exchange. 37489.
- ANDERSON, J. R., Victoria, British Columbia: Received through the Department of Agriculture. Plants (36897, 37035.)
- ANDRÉ, ERNEST, Gray (Haute-Saône), France: One hundred and forty-two specimens of exotic Matillidæ and Formicidæ, representing 75 species. Exchange. 36922.
- ANDREWS, E. F., Washington, Ga.: Stone implement. 37883.
- ANDREWS, Mrs. E. F., Washington, Ga.: Fruit of the Varnish tree, *Sterculia platanifolia*. 36988.
- ANDREWS, W. S., Schenectady, N. Y.: Six skiagraphs of recent shells, prepared by the donor. 37807.
- APPLEGATE, E. I. (See under Agriculture, Department of.)
- ARDLEY, E., Redpath Museum, Montreal, Canada: Thirty-two specimens of Lower Helderberg fossils from St. Helens Islands, Montreal, Canada. Purchase. 37446.
- ARECHA VALETA, J. (See under Montevideo, Uruguay, Museo Nacional.)
- ARMSTRONG, GEORGE, Junction, Tex.: Received through Department of Agriculture. Specimen of *Phascolus retusus* from Texas. 37117.
- ASH, C. E., Jr., Newport, R. I.: Received through Dr. E. A. Mearns. Turtle (*Chrysemys picta*) from Rhode Island. 36716.
- ASHE, W. W. (See under Agriculture, Department of.)
- ASHMEAD, W. H., U. S. National Museum: Insects, spiders, myriapods, and shells from the Hawaiian Islands. 38164.
- ATKINS, EMERSON, East Las Vegas, N. Mex.: Six birds' skins from New Mexico. 37356.
- ATTWATER, H. P., Houston, Tex.: Mammals from Texas (38079); Golden-
checked warbler, *Dendroica chrysoparia*, from Texas (38123).
- AUSTIN, S. W., Independence, Cal.: Eight plants from California. 37535.
- AYMÉ, LOUIS H., U. S. consul, Guadeloupe, British West Indies: Part of an ancient jar and pieces of pottery. 36912.
- AYRES, H. B. (See under Agriculture, Department of.)
- BABCOCK, W. C., Chloride, Ariz.: Specimen of serpentine from Lost Basin, between White Hills and Colorado River. 37634.
- BACON, Mrs. MARY L., San Jose, Cal.: Indian basket. 37495.
- BAILEY, VERNON, Department of Agriculture: One hundred specimens, 15 species, of land-shells from Texas and California (37379); plants from New Mexico and Texas (37599, 38059). (See under Agriculture, Department of.)
- BAIRD, Commander G. W., U. S. Navy, Washington, D. C.: Bronze bust of Charles H. Haswell, first Engineer in Chief of the U. S. Navy. 37396.
- BAKER, C. ALICE, Deerfield, Mass.: Connecticut River clay stones. 37211.
- BAKER, C. F., St. Louis, Mo.: Seven hundred and two plants from the Rocky Mountain region (36771); 75 plants from Colombia, South America (37914). Purchase.
- BAKER, Dr. FRED., San Diego, Cal.: Twenty specimens, 15 species, of marine shells from Lower California. 37588.
- BALDRIDGE, Mrs. MARIA, Devon Inn, Los Angeles, Cal.: Three shells of *Cyprea nigropunctata* from the Galapagos Islands. 38012.
- BALL, C. R., Department of Agriculture: Plants from Louisiana. (36854, 37241, 37742.)
- BALL, M. J. (See under Agriculture, Department of.)
- BALLARD, D. F. A., National Military Home, Kans.: Fossil plant representing the species *Neuropteris clarksoni* Lesquereux. 37179.

- BANG-HAAS, A., and Dr. O. STANDINGER, Dresden, Germany: Seventy-seven butterflies. Purchase. 37116.
- BANGS, OUTRAM, Boston, Mass.: Twenty-four birds' skins from San Miguel Island, Panama (gift) (37155); mammals and birds from Borneo (purchase) (38019).
- BANNERMAN, FRANCIS, New York City: Volcanic magazine carbine (purchase) (36887); 2 cartridge cases picked up on Cuban battlefields (gift) (37298).
- BARBER, E. A., Philadelphia, Pa.: Ethnological objects from Vermont and Pennsylvania (36883); 9 pieces of Bennington (Vermont) pottery (37187). Purchase.
- BARBER, H. S., Washington, D. C.: Eight specimens of dragonflies (36947); lizards from Virginia (38037); reptiles from Arizona (38046); living larvæ of Myrmeleonids. 38078.
- BARBOUR, W. C., Sayre, Pa.: Thirty-one specimens of *Hepatica* from New York and Pennsylvania (exchange) (37214); 100 plants from Pennsylvania (gift) (37593).
- BARNABY, C. W., Urga, Mongolia: Two earthenware votive offerings. 36931.
- BARNCORD, J. H., Ridgeley, W. Va.: Three pieces of chipped flint. 37845.
- BARNDOLLAR, Mrs. J. W. (See under Smithsonian Institution, Bureau of Ethnology.)
- BARNES, Dr. WILLIAM, Decatur, Ill.: Four hundred moths. 37162.
- BARNETT, J. M., Markleton, Pa.: Received through Department of Agriculture. Plant. 37090.
- BARNUM, HENRY, Lower Brule, S. Dak.: Specimen of Indian tobacco (*Chungshasha*), obtained from the Sioux Indians of South Dakota. 36886.
- BARROTT, A. F., Owego, N. Y.: Stone implements and a human skull. 37316.
- BARROWS, W. E. (See under Welsbach Company.)
- BARTSCH, Miss Anna. (See under Y. Hirase.)
- BARTSCH, PAUL, U. S. National Museum: Nest and 5 eggs of Rough-winged Swallow, *Stelgidopteryx serripennis*, from Maryland. 38016.
- BATCHELDER, J. F., Portland, Oreg.: Received through Interior Department, U. S. Geological Survey. Two specimens of chalcopyrite with cobalite, from the East Fork of Dixie Creek, near Prairie City, Grant County, Oregon. 37678.
- BAUM, H., Washington, D. C.: Plant from the Potomac Flats. 37840.
- BEAL, W. J., Agricultural College, Md.: Received through Department of Agriculture. Three hundred and twenty-six plants. Exchange. 36861.
- BEAN, B. A., U. S. National Museum. Glass, porcelain vase, platter, Pennsylvania Deutsch slip ware, and a flat-iron. 36933.
- BEAN, B. A., and KING, W. H., U. S. National Museum. Reptiles, insects, and marine invertebrates from Florida. 37693.
- BEARD, Mrs. BESSIE, Hudson, Wis.: Concretionary quartz from the falls of St. Croix River. 37065.
- BECK, W. H., Washington, D. C.: Spodumene from Etta Mine, Pennington, S. Dak. 37367.
- BECKWITH, PAUL, U. S. National Museum: Four death tags used during the civil war (3 copper and 1 lead), copper 3 Baiocco, Papal States coin issued 1849 (37144); sword belonging to the late Gen. Nathaniel Lyons, U. S. A. (exchange) (37388); 2 campaign buttons (37387); 6 campaign buttons of Messrs. McKinley and Bryan (37407); papers of the Capital Centennial Celebration, held at Washington city, December 12, 1900 (37425); sand bottle (37480); an impression, in metal, of a seal found near Virginia Beach (37503); 25-cent note of Bland County, Va., C. S. A., issued November 13, 1862 (38020).
- BEEDE, J. W., Effingham, Kans.: Fifteen specimens of triassic fossils from Oklahoma Territory (37585); 4 specimens of *Zugmayeria*, n. sp., from Oklahoma

BEEDE, J. W.—Continued.

(37295); 90 specimens of *Fusulina* from the Upper Carboniferous of Kansas (37311). (See also under Interior Department, U. S. Geological Survey.)

BELL, Brig. Gen. J. M., U. S. Army, Washington, D. C.: Filipino hat made of hemp fiber by the Bicolos of the Camarine provinces. 38141. (See under Smithsonian Institution.)

BENEDICT, JAMES E., U. S. National Museum: Caterpillars from the Everglades of Florida (37810); invertebrates and fishes from the western coast of Florida (37849); insects from Florida (37850); miscellaneous collection of insects from Miami (37949); invertebrates from the vicinity of Miami (37990).

BENHAM, J. W., Buffalo, N. Y.: Unfinished basket and material for basket weaving, with two plants from which splints are cut. (38167.)

BENJAMIN, MRS. C. G., Washington, D. C.: Basket from North Africa (37237); ornamented carrying band used by the Nez Percé Indians (37238). Exchange.

BENNETT and HUDSON, Austin, Tex.: Two specimens of Screw worms, representing the species *Lucilia marcellia*. 36895.

BENSON, Capt. H. C., U. S. Army, Bayambang, Philippine Islands. Birds' eggs from the Philippine Islands (36847); 16 birds' skins, nests, and eggs from the Philippine Islands (36896); birds' skins and birds' eggs from Bayambang (36976); 14 birds' skins (37313); 9 birds' eggs and 9 birds' skins from the Philippine Islands (38041).

BENTON, G. B., Rouzerville, Pa.: Wheel bug, *Prionidus cristatus* L. 36961.

BERLIN, PRUSSIA: MUSEUM FÜR NATURKUNDE. Three hundred and ninety-six specimens of Diptera. Exchange. 37967.

BERLINER, Emile, Washington, D. C.: Berliner gramophone. 36816.

BERWERTH, Prof. FRED., K. K. Naturhistorisches Hofmuseum, Vienna, Austria: Piece of Lancé (France) meteorite. Exchange. 37831.

BESSEY, C. S., Lincoln, Nebr.: One hundred and fifty-nine specimens of violets. Exchange. 36846.

BETHEL, E., Denver, Colo.: Plant from Colorado. 37933.

BIBBINS, ARTHUR. (See under Woman's College of Baltimore.)

BIEDERMAN, C. R., Goldhill, Oreg.: Lepidoptera and other insects. (36724, 37451, 37814.)

BIGELOW, E. F., Stamford, Conn.: Miscellaneous insects found on morning-glories. 37025.

BILLINGS, W. R., Ottawa, Canada: Eleven specimens of English fossil starfishes and 12 specimens of Canadian Lower Silurian starfishes (to be added to the I. H. Harris collection) (36959); 58 specimens of fossils (37119). Exchange.

BILLINGSLEY, L., Washington, D. C.: Pistol found at Balls Bluff, Virginia. Purchase. 37695.

BINGHAM, H. O., Shippensburg, Pa.: Continental note, 9 pence, issued in 1781. Purchase. 38022.

BIRD, H., Rye, N. Y.: Specimens of Lepidoptera (36997, 37296).

BIRTWELL, F. J., Albuquerque, N. Mex.: Type specimen of *Parus gambeli thayeri* from New Mexico. 37659.

BLACKMAN, E. E., Roca, Nebr.: Fragments of ancient Pawnee pottery with cloth impressions, found near Fullerton, Nebr. 37891.

BLAIR, J. J., Yukon, Okla.: Locustid. 36869.

BLAISDELL, M. F. E. (See under Agriculture, Department of.)

BLAKE, W. W., City of Mexico, Mexico: Stone with Aztec carving of the Goddess of Water, and a foot-shaped vase made of pottery. Purchase. 37365.

BLANCHARD, WILLIAM S., Washington, D. C.: Watch holder. 37689.

BLANKINSHIP, J. W., Bozeman, Mont.: Four plants from Montana. 36760.

- BLATCHLEY, W. S., Indianapolis, Ind.: Thirty-eight specimens of Orthoptera, including types and cotypes described by the donor. 37687.
- BOAS, Dr. Franz. (See under American Museum of Natural History.)
- BOLTÓN, A. L. (See under Agriculture, Department of.)
- BOTANIC GARDENS. (See under Sydney, New South Wales.)
- BOULDIN, P., Jr., Stuart, Va.: Specimens of staurolite from Patrick County, Va. 37374.
- BOWDISH, B. S., U. S. Army, Mayaguez, Porto Rico: Zoological material from Porto Rico, as follows: Eleven birds' skins (36718); 2 mammals and 4 birds' skins, 3 birds' nests and 6 eggs (36830); mammals and frogs (37196); birds and birds' nests (37415); ^a 3 bats (37526); bat and 2 mice (37544); 2 mammals and a bird less (37720).
- BOWERS, Master HUBERT, Jefferson, Md.: Sphinx moth, *Protoparce cecus* Hübner. 36825.
- BOWERS, Dr. STEPHEN, Los Angeles, Cal.: Twenty-nine specimens (4 species) of Upper Cretaceous invertebrate fossils from Orange County, Cal. (37876); 5 specimens (4 species) of Cretaceous invertebrates from Santa Ana Mountains, California (37564).
- BRADFORD, Rear-Admiral R. B. (See under Navy Department.)
- BRAENDLE, F. J., Washington, D. C.: Eight specimens of dried mushrooms. 37243.
- BRANHALL, Col. W. L., Washington, D. C.: Twenty campaign medals of Washington, Lincoln, Douglas, and other prominent men. 37576.
- BRANCH, Dr. C. W. (See under Smithsonian Institution, Bureau of Ethnology.)
- BRANCH, H. SELWYN, St. Lucia, West Indies: Five skins of Imperial Parrot from Dominica (37222); 31 birds' skins and a small snake from St. Lucia (37782); bats from St. Lucia (38132). Purchase.
- BRANDEGEE, T. S., San Diego, Cal. Received through Department of Agriculture: Thirty-three plants from Lower California (exchange) (37471); 2 plants from Lower California (gift) (37816).
- BRANDT, Dr. K. (See under Kiel, Germany, Zoologisches Institut.)
- BRANNER, Dr. J. C., Stanford University, Cal.: Marine shells from the coast of Brazil near Pernambuco (36975); fossil fishes from the Cretaceous of Brazil (37175).
- BRATLEY, J. H., Havasupai Indian School, Supai, Ariz.: Havasupai brush, scratcher, partly finished basket, a roll of white fiber, and a bunch of strips of "Devil's claws." 37995.
- BRENNAN, J. C. (See under Smithsonian Institution, Bureau of Ethnology.)
- BREWER, E. A., Shellbank, La.: Twenty birds' eggs from Louisiana. 37911.
- BRIGGS, A. A., East Andover, N. H.: Six plants. 36744.
- BRIMLEY, H. H. and C. S., Raleigh, N. C.: Fifteen turtles from Texas and North Carolina (36877); mud turtle (37290); mud turtles from Texas (37291); turtle and 2 garter snakes from North America (37292); 5 cottontail rabbits from Raleigh (37691); 6 rabbits (37756); 4 tree frogs from Mississippi (37874); 6 specimens of *Amphisbaena* from Florida (37879); coon skull (37989); snake (38104). Purchase. (See also under North Carolina State Museum.)
- BRITTS, Dr. J. H., Clinton, Mo.: Ten pieces of Upper Carboniferous limestone containing four specimens of an unknown crinoid. 37935.
- BRÖGGER, Prof. W. C., University of Christiania, Christiania, Norway. Received through Interior Department, U. S. Geological Survey: Two specimens of Laurdalite from Norway. Exchange. 37993.
- BROOKE, Mrs. K. C., Lexington, Va.: Specimens of *Pleurodonte marginella* from Cuba. 36876.
- BROWDER, THOMAS E., Olmstead, Ky.: Stone ax. 37171.

- BROWN, E., Washington, D. C.: Twenty-five specimens of *Mycomyces* from Virginia (37163); 14 specimens of *Mycomyces* from New York (37150).
- BROWN, E. J., Lemon City, Fla.: Birds' skins, bats, reptiles, butterflies, and a fish from Lemon City (37022); Sphinx moth (37617); Mole cricket, 2 beetles, and a Crab spider (38121).
- BROWN, F. A., Savage, Md.: Winnowing fan. 37441.
- BROWN, H., Yuma, Ariz. Received through Dr. L. O. Howard. Fifty-seven insects from Arizona. 37355.
- BROWN, JASPER, Norway, Iowa: Three stone arrowheads found near Norway. 37082.
- BROWN, MRS. J. CROSBY, Orange, N. J.: An alto ophicleide (purchase) (36762); cane flute and a flageolet (exchange) (38138).
- BROWN, J. C., Pacific Grove, Cal.: Crustaceans (37110, 37047).
- BROWN, MRS. N. M., Ashtabula, Ohio: Two hundred and two plants collected by E. A. Goldman. 36856.
- BROWN, RICHARD, Hospital Corps, Bacolod, Negros, Philippine Islands: Gecko, *Peropus mutilatus*, from the Philippine Islands. 37606.
- BROWN, R. A., Saginaw, Mich.: Nest and two eggs of Cerulean warbler, *Dendroica rara*, and two eggs of Cowbird. 37135.
- BROWN, REV. WILLIAM, Northbend, Wash.: Sphinx moth, *Pomonia evaeacatus* Smith and Abbot. 36721.
- BULL, C. P., jr., Ojus, Fla.: *Ophiosaurus ventralis* from Florida. 36971.
- BUNNELL, J. H. & Co., New York City: Four telegraph instruments and a telegraph insulator. 37530.
- BURGESS, ANDREW, Cotton Mills, Laurens, S. C.: Specimen of corundum. 37431.
- BURGI, F., Rochester, N. Y.: Burgi relief map of the Holy Land. 37843.
- BURNHAM, S. H., Vaughns, N. Y.: Plant from New York. 37362.
- BURNS, W. R. (See under Kline, J. J.)
- BUSH, MRS. A. E., San Jose, Cal.: Eighteen species of shells from California (37231); plant (36738).
- BUSH, B. F., Courtney, Mo.: Six hundred and seventy plants from Texas, Arkansas and Missouri. Purchase. 37708.
- BESSING, D. S., Minaville, N. Y.: Two costumes from islands in the Pacific Ocean. Exchange. 37235.
- CAHN, LAZARD, New York City: Specimen of leucophœnicite, from Parker shaft, Franklin, N. J. 37423.
- CALIFORNIA ACADEMY OF SCIENCES, San Francisco, Cal.: One hundred and thirty plants. 37702.
- CALL, R. ELLSWORTH, Museum of Brooklyn Institute of Arts and Sciences, Brooklyn, N. Y.: Specimens of *Cucido-tea stygia* Packard, from Mammoth Cave, Kentucky. 37064.
- CAMBRIDGE UNIVERSITY, Cambridge, England. Received through Dr. David Sharp. Two hundred and sixty-eight specimens of parasitic Hymenoptera. 37615.
- CAMERANO, LORENZO (See under Turin, Italy, Zoological Museum of Turin).
- CAMP, J. H., Lima, Ohio: Beetle (*Chalcophora campestris* Say). 37271.
- CAMPBELL, J. B., Baird, Cal.: Skin and skull of an albinistic gopher (*Thomomys*) (36906); hatchet (37160).
- CANBY, W. M., Wilmington, Del.: Twelve specimens of violets from the United States. Exchange. 37143.
- CANDLIN, H., Greely, Colo.: Lizard (36969); seven snakes (37058).
- CANNON, Miss E., San Francisco, Cal.: Specimen of *Helianthella* from California. 37201.
- CAPITOL, ARCHITECT OF, Washington, D. C.: Plaster model of Bartholdi's statue of Liberty in New York Harbor. 37177.
- CARPENTER, JOSEPH W., St. George, Utah: Ten plants. 37910.
- CARR, MRS. G. O., Washington, D. C.: Indian objects obtained from Great Plains Indians. Purchase. 38163.
- CARRICO, E. T., Stithton, Ky.: Fresh-water shells (37740); snakes (38074).

- CARTER, Lieut. Commander F. S., U. S. Navy, Hydrographic Office, Navy Department, Washington, D. C.: Snakes, in alcohol, from near Iquitos, Peru. 37256.
- CARTWRIGHT BROTHERS, Rye Valley, Oreg. Received through Dr. W. Lindgren. Mastodon and Mammoth teeth. 37236.
- CARY, MERRITT, Neligh, Nebr.: Lizards. 37046.
- CAUDELL, A. N., Department of Agriculture: Ten specimens of Odonata from the Indian Territory and Massachusetts (36945); 19 specimens of *Rhynchota* and a grasshopper (37421); living larvae of Myrmeleionids (38076).
- CHAMBERLIN, R. V., Salt Lake City, Utah: Type specimens of Lithobiidae. 37936.
- CHAMBERLIN, T. S., Vallejo, Cal.: Cato-cala moth, *Catocala nebraskae* Dodge. 37578.
- CHANDLER, H. P., Berkeley, Cal.: Plant (37339); 360 plants collected in the Sierra Nevada of California by Messrs. Chandler and Hall (37696).
- CHARLTON, Prof. O. C., Baylor University, Waco, Tex.: Piece of a meteorite from Fayette County, Tex. 37930.
- CHESTNUT, V. K. (See under Agriculture, Department of.)
- CHISHOLM, R. P., Bessemer, Ala.: Specimens of *Murgantia histrionica* Hahn. 37228.
- CHOSTER, GEORGE W., Southport, England: Ten specimens of *Spiradinella spiralis* Mont., from England; and 50 specimens of *Jordaniella nirosa* Mont., from Norway. 37159.
- CLAGHORN, C. E. (See under Smithsonian Institution.)
- CLARK, E. A., Flagstaff, Ariz.: Coral from near Concho, Apache County, Ariz. 37395.
- CLARK, Dr. E. P., The Plains, Va.: Tusk of a boar and teeth of a drum-fish. 37153.
- CLARKE, Capt. A. G., Lawrence, Kans.: Six-inch shell fired by the U. S. S. *Charleston*, at Calocan, February 10, 1899; wooden cannon with a gas-pipe bore, used during the Philippine insurrection. 36870.
- CLARKE, Dr. JOHN M. (See under New York State Museum.)
- CLEMENTS, F. E., Lincoln, Nebr.: Plant from Colorado. 37091.
- CLEVELAND, Capt. B. D., New Bedford, Mass.: Sea leopard (*Ogmorhinus*). Purchase. 37314.
- CLOUGH, L., Concord, N. H.: Specimen of fluorite from Westmoreland, N. H. 37483.
- COCKERELL, Prof. T. D. A., East Las Vegas, N. Mex.: Insects including several types, also specimens of land and fresh-water shells from New Mexico (37018); insects (37055); 5 plants (37074); insects (37076); insects (37102); 11 moths (37168); 6 specimens of Hymenoptera (37186); 5 specimens of *Cambarus gallinus* and a specimen of *Apus* (37193); land and fresh-water shells from New Mexico (37266); specimens of Lepidoptera (37494); 9 plants from New Mexico (37511); 22 specimens of Lepidoptera and Hymenoptera (37570); 8 specimens of Microhymenoptera (37639); type specimen of *Vitrea carolinensis* var. *wetherbyi* Cockerell, from Roan Mountain, North Carolina (37642); caterpillar from New Mexico (37602); 125 specimens of miscellaneous insects (37612); 7 species of land and fresh-water shells (37803); photograph of a type specimen of plant from Colorado (37818); miscellaneous collection of New Mexican insects (37872); 19 plants from New Mexico (37917); 11 plants from New Mexico (38056); 4 plants from New Mexico (38057); specimen of violet from New Mexico (38118); Meloid beetle, *Leonidia neomexicana* Ckll., and 64 specimens of bees, including 42 types and 4 cotypes of Professor Cockerell's species (38137). (See under Agriculture, Department of; New Mexico Agricultural Experiment Station.)
- COCKERELL, W. P. (See under Agriculture, Department of.)

- COFFMAN, J. B., Dayton, Va.: Loggerhead shrike. 37403.
- COLBURN, A. E., Washington, D. C.: Bat (*Lasiurus borealis*), from Washington, D. C. 37194.
- COLE, Miss EMMA J., Grand Rapids, Mich. Received through Department of Agriculture. Plant from Michigan. 36875.
- COLE, LEON J., University of Michigan, Ann Arbor, Mich.: Two specimens of *Offersia americana* and 1 specimen of *Pseudoffersia maculata*. 37798.
- COLEMAN, Mrs. J. I., Troy, Ariz.: Bagworm (*Oiketicus* sp?). 37980.
- COLEMAN, J. W. (See under Sturtevant, R. D.; Suttle, J. Freeman.)
- COLLIER, ARTHUR J. (See under Agriculture, Department of.)
- COLLINS, F. S., Malden, Mass.: Fifty specimens of algae, comprising Fascicle xv of Phycotheca Boreali-Americana (36927); 75 plants from various localities (37727). Purchase.
- COLLINS, G. N., Department of Agriculture: Thirty specimens of dragon flies from Porto Rico, and 22 specimens from the District of Columbia (36946); through Department of Agriculture, 14 specimens of *Myxomycetes* from New York (37150).
- COLLINS, W. B., Washington, D. C.: Peseña, silver piece, Spanish money, found on board the wreck of the *Viscaya*. 37036.
- COLONNA, B. A., Washington, D. C.: Specimens of baryta from Crowders Mount Mine, Gaston County, N. C. 37282.
- COLUMBIA UNIVERSITY, New York City: Twenty-seven plants, from California and Nevada. 37134.
- COLVILLE, WALTER, Lake St. Johns, Canada: Nine mammal skulls. Purchase. 36804.
- COMABELLA, Dr. I., Barcelona, Spain: Six specimens of *Carabus mulleri*. Exchange. 37881.
- CONGER, EDWIN H. (See under Hobart, Rev. W. T.)
- CONKLIN, S. A., Kilbourne, Ill.: Specimens of *Stylopyga orientalis* Linné. 38075.
- CONZATTI, Prof. C., Oaxaca, Mexico: One hundred plants. Exchange. 37359. (See under Gray Herbarium.)
- COOK, Prof. O. F., Washington, D. C.: Six plants from Ohio, collected by W. A. Kellerman. 36844.
- COOK, W. A. (See under Derby, Orville A.)
- COOLIDGE, DANE, New York City: Mammals, lizards, and crayfishes, from Palermo, Sicily, and Sorrento, Italy (36386); 20 skins and skulls of mammals from Italy (36911); 39 skins and skulls of mammals from Barcelonette, France (37107). Purchase.
- COPE, Mrs. ANNIE P., Haverford, Pa.: Philip Island parrot. Purchase. 38027.
- CORDLEY, Prof. A. B., Oregon Agricultural College, Corvallis, Ore.: Three parasites. 37681.
- COTT, W. C., Badger, Nebr.: Thirty-three butterflies. 37712.
- COUBEAUX, EUGENE, Saskatchewan, Northwest Territory, Canada: Six birds' skins from Canada. Exchange. 37645.
- COUPER, R. H., Cartersville, Ga.: Vertebrae of a snake, and teeth of a bear. 37178.
- COVILLE, F. V. (See under Agriculture, Department of.)
- COX, EMERY, Brightwood, D. C.: Young Purple Grackle, *Quiscalus quiscula*, in the flesh (36706); mole (*Scalops aquaticus*) (37199).
- COX, HAZEL V., Brightwood, D. C.: Fox Sparrow, *Passerella iliaca*, in the flesh. 37763.
- COX, Dr. N. H. D. (See under Smithsonian Institution.)
- COX, W. J. (See under Mollie Gibson Mining Company.)
- CRAGIN, Prof. F. W., Colorado College, Colorado Springs, Colo.: Five topotypes of *Exogyra weatherfordensis*. Exchange. 38156.

- CRAIN, Mrs. E. J., San Pedro, Cal.: Specimen of *Cancellaria cooperi*, from near Point Fermin, California (36733); 3 specimens of *Capulus californicus* Dall, from *Pecten floridus* dredged at San Pedro (37048).
- CRANE, Mrs. A. R., Dawson City, Canada: Lead pencil found in a Stikine Indian hut; skin dresser and deer arrow point from Lake Lebarge, 14 photographs. 37470.
- CRAYER, Rev. SAMUEL P. (See under Foster, W. T.)
- CRAWFORD, LAMAR, Staunton, Va.: Four flint implements from France, and 3 flint arrow points from California. 38068.
- CROSBY, F. W., Washington, D. C.: Marcasite, blende, calcite, etc., from Joplin, Mo. (purchase) (36917); galena and marcasite with dolomite (purchase) (36919); 2 specimens of soapstone from Schuyler, Va. (gift) (37805).
- CROSBY, O. T., Washington, D. C.: Received through Dr. Marcus Benjamin: Abyssinian cincture. 37009.
- CROSS, WHITMAN. (See under Interior Department, U. S. Geological Survey.)
- CROWN, W. S., Washington, D. C.: Albino Bank swallow, *Clivicola riparia*, in flesh. 37020.
- CULIN, STEWART. (See under Free Museum of Science and Art.)
- CUMMINS, M. D., Pierceton, Ind.: Stone ax and a knife blade from Washington Township, Kosciusko County, Ind. 37377.
- CURRIE, R. P., U. S. National Museum: Twenty-one specimens of Odonata and 42 specimens of Hymenoptera from Stockport, N. Y., and 56 specimens of Odonata from Greatfalls, Md. 35694.
- CURRY, J. W., Key West, Fla.: Shrimp. 37596.
- CURTICE, COOPER. (See under Interior Department, U. S. Geological Survey.)
- CURTIS, Mrs. H. M., New Canaan, Conn.: Two black Blister beetles. 36972.
- CURTIS, W. E., Washington, D. C.: Clay pipes from Indiana. 37158.
- CURTISS, A. H., Jacksonville, Fla.: Forty-six plants (gift) (36936); 138 plants from the Southern States (purchase) (37581).
- CUSICK, W. C., Union, Oreg.: Nineteen plants (gift) (37360); 137 plants from eastern Oregon (purchase) (37962).
- DALL, Dr. W. H., U. S. Geological Survey: Lady's parasol (1804). 36894.
- DALY, Mrs. J. E., Washington, D. C.: Quilt embroidered by Mrs. Susan Adel Esputa. 37898.
- DAMON, R. F., Weymouth, England: Model of *Ascoceras*. Purchase. 37357.
- DAMPE, HENRY, New York City: Pseudoscorpion. 37809.
- DANFORTH, R. E., Riceville, N. C.: Specimens of Hymenoptera from Squirrel Island, Maine. 36799.
- DANIELS, Mrs. FLORA, Ulysses, Pa.: Two specimens of *Polistes pallipes* Lapel. 37885.
- DANIELS, L. E., La Porte, Ind.: Crayfish and insects (36986); 9 fossil insects from Florissant, Colo. (37312).
- DANIELS, Dr. Z. T., Siletz Agency, Oreg.: Pewter spoon. 37884.
- DANN, J. W., Honeoye Falls, N. Y.: Specimen of carborundum. 37739.
- DANNEFAERD, S., Auckland, New Zealand: Six birds' skins from New Zealand. Purchase. 37428.
- DARTON, N. H. (See under Interior Department, U. S. Geological Survey.)
- DAVENPORT, G. E., Medford, Mass.: Twenty photographs of ferns of New England. 37130.
- DAVENPORT, H. C., East Orange, N. J.: Pheasant, *Tragopan caboti* (?) (37512); Pheasant (37584).
- DAVIDSON, Dr. A., Clifton, Ariz.: Plants (36746, 37561).
- DAVIS, C. ABBOTT, Providence, R. I.: Three specimens of Hymenoptera. 37465.
- DAVIS, G. C., Ogilby, Cal.: Geological specimens (37591, 37822).

- DAVIS, THOMAS, Crossanchor, Tenn.: Nymph of *Acholla multispinosa* De Geer (37890); Long-sting, *Rhyssa atrata* Fabr. (36723).
- DEAN, SAMUEL B., Arlington, Mass.: Old style English "tyg:"—a three-handled drinking cup. 37225.
- DEANE, WALTER, Cambridge, Mass.: Forty-two plants from Texas, collected by R. N. Larrabee. 37651.
- DEHLS, LOUIS, Kahoka, Ark.: Specimens of *Psidium abditum* Hald, from Arkansas. 38142.
- DEMING, Col. H. C., Harrisburg, Pa.: Specimen of soft rock containing pupal cells of a Digger-bee (*Anthophora* sp.). 38005.
- DERBY, ORVILLE A., Director Geological Survey, São Paulo, Brazil: Ethnological objects from southern Brazil, collected by W. A. Cook. Purchase. 38128.
- DEVLIN, EDWARD, U. S. National Museum: Photograph of the historical hall of the Old Colony Historical Society at Taunton, Mass. (36819); Tree-frog from Maryland (38099).
- DEWEY, L. H. (See under Agriculture, Department of.)
- DEYROLLE, LES FILS D'EMILE, Paris, France: Bird of Paradise (37430); 3 skins of Birds of Paradise (38062); skin of *Amblyornis inornatus* from New Guinea (38063). Purchase.
- DICKEY, J. A., Bristol, Tenn.: Specimens of zinc blende from Bristol. 37632.
- DIEHL, MRS. A. R., New York City: Twelve oriental seals. Purchase. 37370.
- DIETZ, J. J., Grafton, Ohio: Moth (*Attacus cecropia*). 36715.
- DILLER, J. S. (See under Lake, W. C.)
- DIONNE, Mons. (See under Laville University.)
- DITMARS, R. L. (See under New York Zoological Park.)
- DOD, F. H. WOLLEY, Calgary, Alberta, Canada: Moths (new to Museum collection) (37484; 37711).
- DODGE, W. C., Washington, D. C.: Fifty firearms, ancient and modern. Purchase. 37097.
- DOWDEN, Dr. J. E., Fairmount, W. Va.: Mole cricket, *Gryllotalpa borealis* Burmeister. 36776.
- DRAKE, N. F. (See under Leland Stanford Junior University.)
- DRESDEN, GERMANY; Royal Zoological and Anthropological-Ethnographical Museum. Received through Dr. A. B. Meyer: Nine ethnological specimens from British New Guinea, and 6 from eastern Africa. Exchange. 37549.
- DRIVER, FRED, Montserrat, West Indies: Bats from Montserrat. 37198.
- DROOP, E. H., Washington, D. C.: Iron gibbet from Virginia. Purchase. 38091.
- DRURY, C. T., London, England: Forty-eight fronds of cultivated varieties of ferns for use in raising plants from the spores (37149); 2 ferns from England (37306). Exchange.
- DRYSDALE, H. P., Washington, D. C.: Republican campaign token issued in 1860. 37422.
- DU BOIS, Miss CONSTANCE GODDARD, Waterbury, Conn.: Brush of soaproot for cleaning a metate stone, from Mesa Grande, Cal.; redo, or carrying net, made of milkweed fiber, and another one made of palm-leaf fiber. Purchase. 37896.
- DU BOSE, G. M., Lisbon, Ga.: Shells and turtles. (36767, 36768.)
- DU BOSE, J. H., Huguenot, Ga.: Snake, *Diadophis punctatus*, from Georgia (37289); snake (*Cyclophis aestivus*) (36852); caterpillar of a Hawk moth, *Thyreus abbotti* Swains (38077).
- DUCK, D. R., McHenry, N. Dak.: Two birds' skins and a bird's egg. 38048.
- DUERDEN, J. E. (See under Kingston, Jamaica, Institute of.)
- DUGES, Dr. A., Guanajuato, Mexico: Twenty-two specimens of Diptera, 7 representing species new to the Museum collection (37577); 3 plants (37692); crustaceans (38011).

- DUNBLAZER, W. H., Clarksville, Ark.: Two lizards. 38153.
- DUNHAM, PHIBE S., St. Augustine, Fla.: Plaster cast of a sea monster. 37189.
- DUNHAM, S. C., Washington, D. C.: Beach gold from Alaska. Purchase. 37537.
- DUNN, H. H., Fullerton, Cal.: Skin of Swainson's hawk, *Buteo swainsoni* (37942); 14 birds' skins and 4 birds' eggs from California (38102).
- DUNN, JAMES, West End, N. J.: Partially albino specimen of Sea bass (*Centropristes striatus*). 36915.
- DURGEN, Miss B. (See under Agriculture, Department of.)
- DUTCHER, Lieut. B. H. (See under Agriculture, Department of.)
- DYER, J. W., Washington, D. C.: Cannon ball found in Wakefield, Va. 37137.
- EADS, LIZZIE. (See under Medford, H. C.)
- EARLE, F. S., Agricultural Experiment Station, Auburn, Ala.: Two hundred and ninety-five plants from New Mexico (purchase) (37460); 115 specimens of *Viola* (exchange) (38143).
- EASTLAKE, Dr. WARRENTON, Iedamachi, Tokyo, Japan. Received through H. F. Moore: Collection of shells and Japanese insects. 36966.
- EASTMAN, Mrs. M. A., Washington, D. C.: Eleven photographs of New England homespun quilting. Purchase. 37838.
- EASTWOOD, Miss ALICE, San Francisco, Cal.: Twenty-seven ferns from the western section of the United States and Lower California. 37652.
- EATON, A. A., Seabrook, N. H.: Plant (36845); 20 specimens representing the genera *Isotes* and *Lycopodium* (37510). Exchange.
- EDDY, Hon. FRANK M., M. C., Washington, D. C.: Mounted moose head. Deposit. 38098.
- EDWARDS, S. M., Argusville, N. Dak.: Two species of Unionidae from North Dakota. 36797.
- EGGLESTON, W. W., Rutland, Vt.: One hundred plants from Vermont. Purchase. 37903.
- EIGENMANN, Dr. C. H., Bloomington, Ind.: Blind-fish from Illinois, *Chologaster pa-*
- EIGENMANN, Dr. C. H.—Continued.
pilliferus (36734); 2 specimens of Blind-fish, *Amblyopsis speleus* (36806).
- EISEN, GUSTAV. (See under Harriman Alaskan Expedition.)
- ELDRIDGE, GEORGE H. (See under Interior Department, U. S. Geological Survey.)
- ELLS, Rev. MYRON, Union, Wash.: Six half-finished baskets obtained from the Twana Indians (Salishan family). Purchase. 38089.
- ELROD, Prof. M. J., University of Montana, Missoula, Mont.: Land and fresh-water shells (36884); specimens of *Epipragmophora elrodi* Pilsbry, from Missoula Mountains, Montana (37001).
- EMERY, E. R. (See under Agriculture, Department of.)
- EMMONS, Lieut. G. T., U. S. Navy, Princeton, N. J.: Stone dagger from Fort Rupert, British Columbia (purchase) (36823); ethnological material from Alaska (purchase) (37750); ethnological objects obtained from the Tlinkit Indians (purchase) (37889); 4 baskets from the northwest coast (gift) (38082). (See under Smithsonian Institution, Bureau of Ethnology.)
- ENGLISH, G. L. & Co., New York City: Specimens of lead from Sweden, and specimens of arsenic from Germany (37540); æschynite from Ilmen Mountains, Siberia (37673); sulphur crystal from Sicily (37764); specimen of antimony from Prince William, York County, New Brunswick (37799). Purchase.
- EVERMANN, Prof. B. W., U. S. Fish Commission: Sixty-four butterflies and 4 dragonflies from Indiana (37620); insect larvæ (37682). (See under Fish Commission, U. S.)
- FAIRBANKS, H. W. (See under Interior Department, U. S. Geological Survey.)
- FANT, A. L., U. S. National Museum: Twenty-seven pieces of Confederate scrip, dated 1862-1864 (36818); one hundred dollar Confederate note, dated February 17, 1864 (36865).

- FARENHOLT, DR. A., U. S. Navy, Cebu, Philippine Islands: Beetle (*Trichognathus melon* Olivier). 37458.
- FARINGSWORTH, TILTEX, Cedar Creek, Tenn.: Centipede from Porto Rico. 37728.
- FARWELL, O. A., Detroit, Mich.: Specimen of *Thaspium* from Michigan. 37242.
- FAUCETT, WILLIAM, Hope Gardens, Kingston, Jamaica: Two plants from Jamaica. 37536.
- FEATHERSTONHAUGH, DR. THOMAS, Washington, D. C.: Thirty-nine watch movements. 37070.
- FELDCAMP, SERGT. GEORGE, U. S. Army, San Nicholas, Ilocos Norte, Luzon, P. I.: Beetle. 37220.
- FERRISS, JAMES H., Joilet, Ill.: Land and fresh-water shells from Arkansas representing 30 species (36905); fern from Arkansas (37552).
- FIELD COLUMBIAN MUSEUM, Chicago, Ill. Received through F. J. V. Skiff, director: Breech-loading rifle, pocket rifle, and an old-style swivel rifle (gift) (37669); ethnological material from La Plata and Montez, South America (exchange) (38093).
- FINLEY, J. B., Oregon City, Oreg. Received through Department of Agriculture: Plant. 36992.
- FISH COMMISSION, U. S., Hon. G. M. Bowers, Commissioner: Crayfishes collected in West Virginia in 1899 (36745); type specimens of new species of fishes obtained by the steamer *Fish Hawk* expedition to Porto Rico (36735); 100+ specimens of algae from Porto Rico (37165); 14 plants from Indiana (37213); collection of Ophiurans obtained by the steamer *Albatross* in 1891 (37381); plants collected in northern Indiana by Prof. B. W. Evermann (37438); corals, turtle bones, alcoholic reptiles, and mollusks from the expedition of the *Albatross* to the southern seas (37464); plant from Maine (37468); young Egret from Porto Rico (37698); shrimp (*Penaeus brasiliensis*) from Katama Bay, Martha's Vineyard (37703); corals from Porto Rico, collected by the
- FISH COMMISSION, U. S.—Continued.
steamer *Fish Hawk* in 1899 (37753); 363 specimens of fishes from Porto Rico collected by the steamer *Fish Hawk* during January and February of 1899 (37759); collection of Arctic invertebrates made by the Princeton expedition in 1899 (37772); 468 plants collected in West Virginia by E. L. Morris (37835); collection of Japanese crustaceans made by the steamer *Albatross* (37954); skull of a Kamchatkan bear (37958); invertebrates and mollusks obtained principally from the vicinity of Eastport, Maine (38054); specimen of *Aphthalnichthys caribbeus*, type, Gill and Smith, from San Geronimo, Porto Rico, obtained by G. M. Gray (deposit) (38097).
- FISHER, DR. A. K. Received through Department of Agriculture: Fifty plants from Alaska collected by Messrs. Fisher and Osgood. 37205. (See under Agriculture, Department of; Grinnell, Dr. George Bird; Little, L. G.)
- FISHER, H. H., Corpus Christi, Tex.: Specimen of *Cassia acutifolia* from Texas. 37736.
- FISHER, H. L., Califon, N. J.: Three plants from New Jersey. 37112.
- FISHER, W. H., Baltimore, Md.: Snake representing the species *Storeria dekayi* (36851); 4 snakes representing the same species from Maryland (36892); snake (*Eutaenia saurita*) from Maryland (37923).
- FLEMING, J. IL, Toronto, Ontario, Canada: Two Stitch birds representing the species *Pogonornis cineta*, from New Zealand. Purchase. 36711.
- FLETCHER, DR. JAMES, Dominion Entomologist, Ottawa, Canada: Fifty moths, including four type specimens. 37779.
- FLETCHER, O. K., Hospital Corps, U. S. A., Manila, P. I.: Specimen of *Tectoris banksii* Donovan. 36858.
- FLETT, J. B., Washington, D. C.: Plants from Alaska. (37092, 37507, 37635.)
- FLOYD, A. L. Washington, D. C.: Old-style machete blade from Guayama, Porto Rico, used by the donor during the war with Spain; knife used by a

- FLOYD, A. L.—Continued.
sailor in the U. S. Navy; U. S. signal flag used during the Cuban campaign. Purchase. 36770.
- FLOYD, F. G., West Roxbury, Mass.: Five living specimens of *Dennstedtia*, from Massachusetts. Exchange. 37206.
- FOOTE MINERAL COMPANY, Philadelphia, Pa.: Specimen of silver, from Keweenaw district, Michigan; slab of Sacramento meteorite (37539); geological specimens from various localities (37647). Purchase.
- FORT MONROE ARSENAL, Fort Monroe, Va. Received through Col. W. A. Mayre, U. S. Army: Two Springfield muzzle-loading rifles; 2 Springfield breech-loading shotguns; 2 Joslyn breech-loading carbines; 2 Colt's army revolvers; 2 Remington army revolvers, and 2 Remington navy revolvers. Purchase. 37533.
- FOSTER, W. T., Sapucay, Paraguay. Received through Hon. J. N. Ruffin, U. S. consul, Asuncion, Paraguay: Collection of insects (purchase) bird skin and frogs (gift) (37045); 3 bats from Sapucay (gift) (37061); received through Rev. Samuel P. Craver and Miss Mary W. Swaney, 80 birds' skins from Paraguay (purchase) (37209); about 170 bats from Paraguay (purchase) (37875).
- FOUGNER, IVER, Crookston, Minn.: Collection of ethnological objects from Bella Coola, British Columbia. 37973. (See under Smithsonian Institution, Bureau of Ethnology.)
- FRANKFORT ON THE MAIN, GERMANY; MUSEUM SENCKENBERGIANUM. Received through Dr. F. Kinkelin: Collection of fossil plants. Exchange. 36934.
- FREE MUSEUM OF SCIENCE AND ART, Philadelphia, Pa.: Received through Stewart Culin, director: Five plaster casts of archaeological objects. Exchange. 37005.
- FRENCH, Capt. F. H., U. S. Army, Bagason, Panay, P. I.: Copy in English of Aguinaldo's "Notice of Justice," a mask, a cigarette holder, and a copy of Aguinaldo's address to the Filipino people. 37463.
- FREY, Dr. B. F., New Smyrna, Fla.: Cerambycid beetle, *Callichroma splendidum* Leconte. 36839.
- FRIERSON, L. S., Frierson, La.: Shells from Louisiana. 37063.
- FRITSCH, Dr. Anton, Prague, Bohemia: Plaster cast of a bust of Joachim Barande. 37433.
- FULLER, T. A., Calumet, Mass.: Ear of pop corn affected with larvae. 37104.
- FUR SEAL COMMISSION, Treasury Department: Collection of photographs of fur seals. Deposit. 37276.
- FURBUSH, Capt. C. L., Tagbilaran, Bohol, P. I.: Four tanned skins of Lemur (*Galopithecus*). 37224.
- GAINES, ANGUS, Vincennes, Ind.: Frog. 36728.
- GARMAN, H., Agricultural Experiment Station, Lexington, Ky.: Ten specimens of *Armadillidium vulgare* from Lexington. 37824.
- GARNER, D. L., New York City: Ethnological objects from Mpahomus or Pfau tribe of West Central Africa. 36893.
- GEE, N. GIST, Columbia Female College, Columbia, S. C.: Specimen of *Branchipus*. 37791.
- GEER, Hon. O. L. (See under Smithsonian Institution.)
- GELLINEAU, PETER, Westerhall Estate, Grenada, W. I.: Bats from the West Indies. Purchase. 38083.
- GEOLOGISCHES INSTITUT. (See under Kiel, Germany.)
- GEORGESON, C. C. (See under Agriculture, Department of.)
- GEREND, JOHN, Sheboygan, Wis.: Sixteen stone sinkers and two pieces of pottery from an Indian camping site in Wisconsin. 38103.
- GERRARD, E., Camden Town, London, England: Skeleton and stuffed specimen of a Golden mole. Purchase. 37901.
- GIBSON, A. J., Round Lake, Miss.: Stone implement from Mississippi. 37778.
- GIER, E. T., Washington, D. C.: Bats and three insects from Trinidad, West Indies. Purchase. 36938.

- GILBERT, MRS. A. P., Logan, Okla.: Specimen of *Conorhinus sanguisuga* Leconte (36817); specimen of *Datames formidabilis* Simon (36899); Harvest fly, *Cicada dorsata* Say (37019); Scarabæid beetle belonging to the genus *Phaneus* (37050).
- GILBERT, WALTER M. (See under Loubat, M. le duc de.)
- GIRAULT, A. A., Annapolis, Md.: Galls of *Neuroterus* sp., and two specimens of *Smicra mariæ* Riley (38004); galls and specimens of *Phylloxera caryocaulis* Fitch, and a specimen of *Catolaccus* n. sp. (38064).
- GIRTY, DR. GEORGE H. (See under Interior Department, U. S. Geological Survey.)
- GODMAN, F. DU CANE, London, England. Received through E. A. Smith, British Museum: Sixty-ninespecies of land and fresh-water shells from Mexico and Central America. 38139.
- GOFF, DEAN S., Metlatoyuca, Eastern Puebla, Mexico (Ranco Elgin): Two plants from Eastern Puebla, Mexico. 37999.
- GOLDER, F. A., Unga, Alaska: One hundred plants from Alaska. 37204.
- GOLDMAN, E. A., Washington, D.C.: Plants from Mexico (37667, 37731). (See under Agriculture, Department of; Brown, Mrs. N. M.; Nelson, E. W.)
- GOLDMAN, MRS. LEO, Phoenix, Ariz.: Four specimens of basket material obtained from the Pima Indians of southern Arizona. 36749.
- GOLL, REV. G. P., Maytown, Pa.: Insects and reptiles collected at Mount Coffee, Liberia, West Africa. 37012.
- GONZALES, V. (See under Gray Herbarium.)
- GOODFELLOW, WALTER, Paris, France: One thousand one hundred and thirty-six specimens of Humming birds, from Ecuador. Purchase. 36885.^a
- GOODRICH, MRS. L. L., Syracuse, N. Y.: Seven plants belonging to the genus *Epipactis* (exchange) (36939); specimen of Hart's tongue from the original American station at Split Rock, Geddes, near Syracuse (gift) (37827).
- GORDON, R. H., Cumberland, Md.: Thirty-nine specimens of Oriskany and 236 specimens of Lower Helderberg fossils, from Mr. Gordon's collection. 37122.
- GORDON, R. H., and Hartley, Frank, Cumberland, Md.: Sixty pieces containing fossils illustrating the Lewiston formation section at Pinto, Md. 37392.
- GORTNER, S. A., Rhea Springs, Tenn.: Crab-spider, *Acrosoma spinea* Hentz. 36801.
- GOTCHER, H. F., Copperas Cove, Tex.: Specimen of ilmenite with native gold from New Mexico. 38158.
- GOTTSCHALL, A. H., Harrisburg, Pa.: Twined basket made of bulrushes from the western coast of Oregon. 37893.
- GRAHAM, D. D. Received through Mrs. M. C. Stevenson, Bureau of Ethnology. Three Zuñi dresses and a pair of mocasins. Purchase. 37926.
- GRAY, G. M., Woods Hole, Mass.: Six specimens of crustaceans. 37004. (See under Fish Commission, U. S.)
- GRAY HERBARIUM, Cambridge Station, Boston, Mass.: Two plants from Mexico, collected by C. G. Pringle (37305); 356 plants from Mexico and Central America (37358); 22 Mexican plants (37609); 12 plants from Mexico, collected by C. Conzatti and V. Gonzales (37937); 531 plants from the United States and Mexico (37950); 37 plants collected by Messrs. Townsend and Barber in Mexico (37951); 2 plants from Costa Rica (38126). Exchange.
- GRAYSON, G. H., Arkadelphia, Ark.: Head of Buffalo-fish, *Ictiobus bubalus*. 37075.
- GREASON, MISS MIRA, Kaw Agency, Oklahoma: Ancient pottery vase from Hawikuh, near Zuñi, N. Mex. 36824.
- GREBNITSKI, N. A. Received through Dr. Leonhard Stejneger: Thirty-seven plants from the Commander Islands, Bering Sea. 38124.
- GREGORY, ARTHUR, Durango, Mexico: Molds of two rare Mexican coins. 37590.
- GRIBBLE, R. W., Weston, Tex.: Teeth and bones of small fishes and 6 cretaceous invertebrates. 37832.

^a Received in 1900.

- GRIFFIN, WILLIAM, Somerset, Ky.: Specimens of bituminous limestone from South Fork River, Pulaski County, Ky. 37315.
- GRINNELL, DR. GEORGE BIRD, New York City. Received through Dr. A. K. Fisher: Type of *Sciurus navius notabilis*. Deposit. 36998. (See under Kelley, Capt. Luther S.)
- GROTE, A. R., Hildersheim, Hanover, Germany: Hofmann collection of Lepidoptera. Purchase. 37099.
- GROUT, DR. A. J., Boys' High School, Brooklyn, N. Y.: Specimen of *Lycopodium chamaecyparissus* from Vermont (37828); 50 plants (37792).
- GRUBBS, DR. ROBERT, U. S. Army, Manila, P. I.: Specimen of *Phyllium*. 37856.
- GULDBERG, ANSGAR, Christiania, Norway: Seven specimens of minerals from Norway. Purchase. 38092.
- GUNN, FANNY A., Washington, D. C.: Eight eggs of Carolina Paroquet, *Conurus carolinensis*. Purchase. 37497.
- GUTHRIE, LEON J., U. S. Weather Observer, Curaçao, West Indies: One hundred and twelve bats from the West Indies. Purchase. 37658.
- HABERER, DR. J. V., Utica, N. Y. Received through Department of Agriculture: Twenty-seven plants from New York (37841); 12 plants from central New York (37700).
- HAERLANDT, W., and PIPPOW, Berlin, Germany: Five mammal skins. Purchase. 37109.
- HAGUE, ARNOLD. (See under Interior Department, U. S. Geological Survey.)
- HALL. (See under Chandler, H. P.)
- HALL, HARRY O., Army Medical Museum, Washington, D. C.: Water-color sketch of the flag used by the minute men at the battles of Concord and Lexington, April 19, 1775. 37504.
- HAMLIN, HOMER, Los Angeles, Cal.: Eleven specimens of Tertiary (?) corals and pelecypods from Los Angeles (37488); humerus of a fossil Auk and a few other bones (37826).
- HARDEN, E. D., New Orleans, La.: Mole cricket (*Gryllotalpa borealis* Burmeister). 37218.
- HARING, A. B., Frenchtown, N. J.: Caterpillar of *Cecropia Sphinx* moth, *Ceratomia catalpae* Boisduval. 37010.
- HARPER, ROLAND, M., New York City: Nine hundred and seventeen plants from Georgia (37672); plants from Georgia (37907, 38058).
- HARRIMAN ALASKAN EXPEDITION. Received through Dr. C. Hart Merriam. Type specimens of new species of Enchytraeidae, described by Gustav Eisen. 36879.
- HARRINGTON, W., Hague, Ottawa, Canada: Fifteen bumble-bees. 37858.
- HARRISON, BENJAMIN, Jacksonville, Fla.: Specimen of *Pterophyrne histrio*, from Nassau Sound, Florida. 37654.
- HARRISON, MISS CARRIE, Department of Agriculture: One hundred specimens of mosses and lichens collected in the Adirondacks (37054); 40 plants from Massachusetts (37384).
- HART, W. W., & Co., New York City: Alaskan sheep and skull, mountain goat, musk ox, Newfoundland lynx. (37324, 37522, 37851.) Purchase.
- HARTLEY, FRANK, Cumberland, Md.: Seventeen specimens of fossils (37121); 23 specimens of Helderbergian fossils, from Cumberland and Pinto, Md. (37928).
- HARTLEY, FRANK and GORDON, R. H., Cumberland, Md.: A collection of fossils illustrating the Lewiston formation section at Pinto, Md. 37392.
- HARTLEY, M. (See under Remington Arms Company.)
- HARVEY, Prof. F. L. (See under Agriculture, Department of.)
- HARVEY, L. H., Orono, Me.: Sixty plants from Maine. Purchase. 36759.
- HARWARD, Miss WINNIE, Albuquerque, N. Mex.: Received through Department of Agriculture. Nineteen plants from New Mexico. 36780.
- HASSE, DR. H. E., Soldiers Home, Los Angeles, Cal. Received through Department of Agriculture: Seven plants from California. 37516.

- HATCHER, J. B., Carnegie Museum, Pittsburgh, Pa.: Fossil meat of nuts and fossil wood from Squaw Creek, Sioux County, Nebr. 37479.
- HAWKES, Maj. E. L., Washington, D. C.: Kris, two bolo knives, spear, bamboo bow, arrows and quiver, and wooden bow from the Philippine Islands. Purchase. 38084.
- HAWKINS, D. D., Terra Ceia, Fla.: Skeleton of a porpoise from Tampa Bay, Fla. 37895.
- HAWLEY, E. H., U. S. National Museum: Dutch hautbois, or Discant schalmay. Purchase. 37389.
- HAY, MARSHALL P., Tallapoosa, Ga. Received through Department of Agriculture: Nineteen plants. 36811.
- HAY, W. P., Hinton, W. Va.: Insects (36782); 2 salamanders from West Virginia (36785); specimens of Hymenoptera and other insects (36956); 50 specimens of *Cambarus affinis* from the Potomac River (38095).
- HEARNE, W. H., Vivian, La.: Mole cricket, *Gryllotalpa borealis* Burmeister. 37051.
- HEGEN, R. H., Miami, Fla.: One hundred and sixty-five specimens of miscellaneous moths, principally Sphingidae (38008); 75 miscellaneous specimens of moths (38120).
- HEITMULLER, A., Washington, D. C.: Two altars from a Roman Catholic Church at Hildesheim, Germany. Exchange 37132.
- HEMP, Miss LAURA, Jefferson, Md.: Larva of Sphinx moth. 36833.
- HENDERSON, J. B., Washington, D. C.: Land and fresh-water shells from Haiti. 37521.
- HENSHAW, H. W., Hawaiian Islands. Received through Dr. L. O. Howard: Two hundred and sixty-four Hawaiian insects (36832); crustaceans (37030); miscellaneous collection of insects from the Hawaiian Islands (37105); shrimps (37240); crabs and shrimps (37255); crustaceans, mollusks, reptile, and a fish (37085); natural history specimens from the Hawaiian Islands (37293, 37487, 37524, 37690).
- HENSHAW, SAMUEL. (See under Museum of Comparative Zoology.)
- HEPBURN, Dr. J. H., Fort Bayard, N. Mex.: Specimen of Scarabæid beetle, *Dynastes grandis* Horn. 37043.
- HERRERA, Prof. A. L., City of Mexico, Mexico. Received through Department of Agriculture: Plant. 37182.
- HERRON, Lieut. J. S. (See under Agriculture, Department of.)
- HILDER, Col. F. F. (deceased): Microscopic newspaper sent into Paris during the German siege, 1870-71, by means of carrier pigeons (36989); 8 human skulls from a small cemetery (Tatalog) north of Manila (37500); 7 specimens of pottery from a cemetery near Santa Ana, Manila, Philippine Islands (37769); 12 sets of negatives and a set of prints of Philippine men and women of different tribes (38094).
- HILL, E. H., Savannah, Ga.: Indian burial pot. Purchase. 36748.
- HILL, M. S., Blaine, Wash.: Three photographs of Makah Indians. 37394.
- HILLIARD, G. R., Urbana, Ohio: Worm, *Pecoccephalus kewense* (Moseley).
- HINDMAN, ALBERT, Elmo, Ark., received through Department of Agriculture: Four plants from Arkansas. 37089.
- HINE, Prof. JAMES S., Ohio State University, Columbus, Ohio: Four Panorpidæ, new to the Museum collection. 37717.
- HIRASE, Y., Kyoto, Japan. Received through Miss Anna Bartsch. Fifty species of Japanese shells. Purchase. 37729.
- HITCHCOCK, A. S., Agricultural College, Manhattan, Kans.: Five hundred and forty-two plants from southwestern Florida. Purchase. 37723.
- HITT, J. E., Augusta, Ga.: Specimen of *Corydalis cornutus* Linnaeus. 36881.
- HOBART, Rev. W. T., received through Mr. Edwin H. Conger, Envoy Extraordinary and Minister Plenipotentiary of the United States to China: Lock and key to the city gate of Peking, known as the "front gate." 37959.
- HODGE, Dr. E. R., Army Medical Museum, Washington, D. C.: Three postage stamps of the milésima denomi-

- HODGE, Dr. E. R. (Continued.)
nation and 3 of the centavo denomination. 37852.
- HODGE, F. W., Smithsonian Institution:
Two arrow points, piece of obsidian, fragments of pottery and pumice stone from New Mexico. 37501.
- HOGAN, WILLIAM, Olmstead, Ky.: Stone pestle. 37172.
- HOGG, J. M. (See under Smithsonian Institution, Bureau of Ethnology.)
- HOLCOMB, BENTON, West Granby, Conn.: Beetles and cedar wood. 37771.
- HOLMES, J. H., Dunedin, Fla.: Marine shells (36796); starfish (*Luidia alternata*) from Sanibel Island (37705).
- HOLMES, J. S., Bowmans Bluff, N. C.: Jumping mouse 36805.
- HOLMES, W. H., U. S. National Museum:
Two specimens of iron ore from Nova Scotia (37234); 107 specimens of shop refuse from the Jasper quarry at Durham, Pa. (37248). (See under Smithsonian Institution, Bureau of Ethnology.)
- HOLZINGER, J. M., Winona, Minn., received through Department of Agriculture: Moss from the Yellowstone National Park (37436); 5 plants from Minnesota and Montana (37817).
- HOOPER, I. H., Raht, Tenn.: Piece of rock, with supposed inscriptions, taken from an ancient wall in Raht. 36766.
- HOPKISS, M. H., Louisville, Fla.: Two plants from Florida. 37125.
- HORCH, JACOB A., Soldiers' Home, Washington, D. C.: Coins from the Philippine Islands. Purchase. 37746.
- HORNADAY, W. T., New York City: Head skins of buffalo and Rocky Mountain sheep. 37627.
- HORNUNG, Dr. JOHN, San Francisco, Cal.:
Nine mammal skins (36831), 10 starfishes from San Francisco Bay (37603); 3 mammals (37745).
- HORGH, Dr. WALTER. (See under Smithsonian Institution, Bureau of Ethnology.)
- HORSE, H. D., Oneida, N. Y.: Fifty specimens of *Viola schreckii* from New York (37032); 2 plants (37702). Exchange.
- HOVEY, G. C. S., White Church, Kans.: Six scraper stones, from Wyandotte County, Kans. 37793.
- HOWARD, Dr. L. O. (See under Adams, Samuel H.; Agriculture, Department of; Brown, H.; Henshaw, H. W.; Stover, Oliver O.; Townsend, Prof. C. H. Tyler.)
- HOWE, C. F., Chalky Mount, Barbados, West Indies: Geological specimens. 36958.
- HOWELL, A. H., Department of Agriculture: Eighteen plants from Mansfield, Vt. 36938.
- HOWELL, E. E., Washington D. C.: Three series of Bohemian trilobites, showing the development of *Arethusina*, *Dalmanites*, and *Trimucleus* (purchase) (36925); meteoric iron from Canyon Diablo, Ariz. (exchange) (37066); relief map of Palestine (purchase) (37372); specimens of fossil wood from near Holbrook, Ariz. (purchase) (37538); 5 pieces of polished agate and 2 agate spheres (purchase) (37641); 11 fossil crinoids (purchase) (37722).
- HUENE VON, Dr. T. (See under Interior Department, U. S. Geological Survey.)
- HULBERT, H. B., Seoul, Korea, received through Rev. E. E. Rogers: Korean monocycle. Purchase. 37613.
- HULST, Rev. G. D., Brooklyn, N. Y.:
Eleven specimens of Lepidoptera (gift) (36996); 2 specimens of ferns from New York (exchange) (37133); plant (*Polypodium vulgare cambricum*) from New York (37254).
- HUMPHREYS, J. W., Colon, Colombia:
Fourteen bats from Colombia. Purchase. 38090.
- HUNTER, Mrs. MARY, Washington, D. C.:
One hundred plants from the District of Columbia. Purchase. 37033.
- HUNTER, W. G., Washington, D. C.: Gold ore from near Marshall, N. C. 37267.
- HUPPERTY, CHARLES. (See under Agriculture, Department of.)
- HUTCHENS, J. M. (See under Agriculture, Department of.)
- HUTCHINS, D. B., Hart, Mich.: Concretion. 37920.
- HUTCHINSON, W. F., Winchester, Va.: Skull of a Virginia deer, *Odocoileus virginianus*. 37939.

HYSELL, Dr. J. H., Santiago, Cuba: Crustaceans, beetles, toads, and lizards. Purchase. 37550.

IHERING, Dr. H. von, Museu Paulista, São Paulo, Brazil: Specimens of miscellaneous Unionidae and marine shells from Guatemala and Brazil. 37767.

INTERIOR DEPARTMENT, *United States Geological Survey*: Specimens of borings (deposit) (36967); Hot Springs deposits and bat guano, from Glenwood Springs, Colo. (37131); Chamberlain shales, from Belt terrane, Big Belt Mountains, Mont., and interformational conglomerates from Belt series, Dearborn River, Mont. (37176); 18 specimens of *Oldhamia occidentis* Walcott, from the Cambrian of New York (37226); 35 calciferous fossils from Iowa Mine, Smithville, Lawrence County, Ark.; 33 Lower Silurian fossils from Black Hills, S. Dak., collected by T. A. Jaggar and J. W. Beede; 65 graptolites from California, collected by H. W. Turner; 1,790 Cambrian brachiopods identified by Hon. Charles D. Walcott, and 375 Pre-Cambrian fossils, including the types described and figured by Mr. Walcott (37302); collection of rocks from the Ten-Mile District of Colorado, and Sultan Mount, San Juan County, obtained by Whitman Cross (37322); Dinosaur bones and mammal bones (37346); part of a tusk of a fossil elephant (37419); barite in rhyolite, from Castle Rock, Douglas County, Colo., collected by N. H. Darton (37424); 32 specimens of Ordovician fossils, from the Massanutten sandstone of Goshen, Va. (37453); 26 Niagara fossils from Indian Territory; 1,190 Helderbergian fossils from the same Territory, 140 Oriskanian fossils from the same Territory, and 50 Upper Devonian fossils from Colorado, collected by Dr. G. H. Girty (37478); series of asphalt and bituminous rock specimens collected by G. H. Eldridge (37481); 86 specimens of ores, from the Telluride region of Colorado, selected from the original working collection made in 1896 by C. W. Purington (37485); fossil plants from California (37569); 40 Silurian fossils from Big Belt Mountains,

INTERIOR DEPARTMENT, *United States Geological Survey*—Continued.

Mont., collected by Hon. C. D. Walcott; 790 Ordovician fossils from Nevada, collected by J. E. Spurr and F. B. Weeks; 170 Devonian fossils from Nevada, collected by J. E. Spurr (37571); collection of rock specimens from San Luis quadrangle, California, collected by H. W. Fairbanks (37611); 50 specimens of rocks from the Boise quadrangle, Idaho, collected by Mr. W. Lindgren (37649); 4 specimens of chrysolite, 1 specimen of realgar, 9 specimens of pisanite, etc., and 1 specimen of olivenite, and a specimen of quartz (37676); 275 specimens of *Obolchella atlantica*, from Conception Bay, Newfoundland, and 230 Cambrian brachiopods, from Utah and Colorado (37709); 50,000 specimens of duplicate Miocene mollusks, from Maryland, and Pliocene, from Florida (37761); 1,140 Ordovician and Silurian fossils from the Franklin Range, near El Paso, Tex. (37762); rock illustrating mud cracks in shaly Cambrian sandstone from near Columbine Lake, Animas Valley, Engineer Mountain quadrangle, Colorado, collected by Dr. G. H. Girty (37811); 125 Cambrian brachiopods from Nevada (37943); collection of Cambrian fossils from Newfoundland, made by Hon. Charles D. Walcott and S. Ward Loper (37944); 150 specimens of Upper Cambrian brachiopods, from Osceola, Nev. (37945); collection of Cambrian fossils from Russia, Norway, and Sweden, made by M. Schmalensee (37946); 13 Cambrian and Ordovician fossils collected by Dr. T. von Huene in Norway and Sweden (37947); 30 specimens of calciferous fossils from Tennessee and 28 specimens of Silurian fossils collected by Cooper Curtice (37953); large block of black obsidian from Obsidian Cliffs, Yellowstone National Park, collected by Arnold Hague (37969); 3 specimens of fish remains from Rockwood, Colo., collected by Whitman Cross, and fish remains from Aspen, Colo., collected by George W. Tower (37970); rocks from Pike's Peak quadrangle, Colorado, including many specimens from the Cripple Creek

- INTERIOR DEPARTMENT, *United States Geological Survey*—Continued.
- special quadrangle, collected by Whitman Cross (38042); collection of rocks and ores from Elkhorn, Mont., collected by W. H. Weed (38085). (See under Batchelder, J. F.; Brögger, Prof. W. C.; Lucas, I.; Washburne, Chester.)
- INTERNATIONAL EMERY AND CORUNDUM COMPANY, Chester, Mass.: Specimens of corundum and two specimens of margarite. 37839.
- IRELAND, W. J., Arapahoe, Nebr.: Spider representing the species *Lathrodectus matans* Fabr. (37219); pedipalp (37966).
- JAGGAR, T. A. (See under Interior Department, U. S. Geological Survey.)
- JAMES, F. L., Grand Mound, Wash.: Specimen of *Mantispa brunnea* Say (36722); specimen of *Sinea diadema* Fabr. (36974).
- JAMES, MRS. JULIAN, Washington, D. C.: Straw hat from Porto Rico, made of strips of palm leaf dyed red and green (37994); silver ring, presented by the Indian chief, Chin-ko-ka-ki-pa, to Charles King Gracy (38080).
- JANSON, O. E., & SON, London, England: Three specimens of Whitehead mammals (36789) 4 specimens of Whitehead mammals (36970); 14 birds' skins from the Philippine Islands (36834); skeleton of Moa, *Eurypaperyx crassa* (36904); 4 mammal skins (36859). Purchase.
- JARVIS, P. W., Kingston, Jamaica: Five crabs. 37998.
- JENKINS, Dr. O. P., Stanford University, Cal.: Type specimens of fishes from the Hawaiian Islands, collected by Drs. Jenkins and T. D. Wood. 37724.
- JOCHMEMSON, LOUIS. (See under Robb, M. L.)
- JOHNSON, Prof. C. W., Wagner Free Institute, Philadelphia, Pa.: One hundred and thirty-five specimens of Diptera representing cotypes and several new species and genera (36994); 7 specimens of Diptera including 3 cotypes (37057); 6 specimens of Diptera, including one cotype (37456).
- JOHNSON, T. K., Guthrie, Okla.: Larva of a moth (*Lagoa crispata* Packard). 37011.
- JOHNSON, WILLIAM R., Rossland, S. C.: Specimen of *Harpactor americanus* Bergr. 38129.
- JONES, A. W., Salina, Kans. Received through T. W. Stanton. Two fossil plants from bluffs on Smoky River, Ellsworth County, Kans. 37259.
- JONES, C. W., Battersea, England: Five broken clay pipes and a copper coin (37748); 15 clay pipes and a fragment of a stem, from the grounds of Lambeth Palace, London (37528).
- JONES, MARCUS E., Salt Lake City, Utah: One hundred and twenty-six plants. 37775.
- JORDAN, Dr. DAVID S. (See under Leland Stanford Junior University.)
- JOUY, MRS. M. S. F., U. S. National Museum: Five tracings of sculptures on ruin of Xochialco, Mexico, made by the late P. L. Jouy. 37534.
- KANSAS, UNIVERSITY OF, Lawrence, Kans. Received through E. H. Sellards: Fossil plants from the Lawrence shales and Permian of Kansas (exchange) (36853). Received through S. W. Williston: Nineteen specimens of Permian *Fusulina* from Beaumont, Kans. (37304) (gift); 111 fossil plants (exchange) (37677).
- KEARFOTT, W. D., New York City: Twenty-two specimens of Lepidoptera, native and exotic (36720); 28 specimens of Lepidoptera from New Guinea and Australia (37353).
- KEARNEY, T. H., Jr. (See under Ruth, A.)
- KEELER, L., Benton, Ohio: Larva of *Orgyia leucostigma*. 36714.
- KELLERMAN, W. A. (See under Cook, Prof. O. F.)
- KELLOGG, R. S., Department of Agriculture: Two teeth of *Ptychodus*. 37630.
- KELLY, Capt LUTHER S., U. S. Army, Dapitan and Dajsitán, Mindanao, P. I. Received through Dr. George B. Grinnell: Skin of Hornbill, from the Philippine Islands (36941); horns of Min-

- KELLY, Capt. LUTHER S.—Continued.
 danao Barking deer (*Rusa*) (38026).
 (See under War Department.)
- KELSEY, F. W., San Diego, Cal.: Eighteen specimens of fresh-water mollusks, 3 species, from China. 36828.
- KENDALL, W. C., U. S. Fish Commission: Twenty specimens of fossils, 3 species, from Freeport, Me. 37432.
- KERR, JOHN G., Denver, Colo.: Indurated volcanic mud. 37475.
- KIEFER, GEORGE. (See under War Department.)
- KIEL, GERMANY, GEOLOGISCHES INSTITUT. Received through Dr. K. Brandt, director: Crab (*Pseudothelphusa fossor*). Exchange. 36736.
- KILBOURNE and FORRESTER, St. Francisville, La.: Albino specimen of the common mole (*Scalops aquaticus*). 37865.
- KIMBALL, JAMES P., New York City: Specimens showing replacement of limestone by martite, from Serita River, Vancouver Island, British Columbia. 38021.
- KIMBALL, Miss L. F., National City, Cal.: Thirty ferns from California (exchange) (36725); 8 plants representing the species *Asplenium respertinum* (gift) (37755); 12 ferns from San Diego County, Cal. (exchange) (37956).
- KINCAID, Prof. TREVOR, University of Washington, Seattle, Wash.: Twenty-two Psychodidae representing types of 9 species (gift) (36882); Alaskan crabs (exchange) (36890); 12 moths from Rock Springs, Wyo. (gift) (37049).
- KING, W. H., and BEAN, B. A., U. S. National Museum: Reptiles, insects, and marine invertebrates from Florida. 37693.
- KINGEL, F., Palm Beach, Fla.: Two moths and a larva. 36764.
- KINGSTON, JAMAICA, INSTITUTE OF JAMAICA. Received through J. E. Duerden: Four specimens of *Peripatus*. 37664.
- KINKELIN, Dr. F. (See under Frankfort on the Main, Museum Senckenbergianum.)
- KINNEAR, W. T., Forss by Thurso, Scotland: Ten specimens of paleozoic fishes. Purchase. 37546.
- KIRK, HARRY J. (See under Agriculture, Department of.)
- KIRKALDY, W., Wimbledon, England. Sixty-six specimens of Hemiptera. Exchange. 37789.
- KIRSCH, LOUIS. (See under Williamsburgh Scientific Society, Brooklyn, N. Y.)
- KIZER, Dr. D. T., Springfield, Mo.: Shells. 36848.
- KLEINSCHMIDT, E. H., Helena, Mont.: Acadian owl *Nyctala acadica*, from Montana. 37496.
- KLINE, J. J., Concord, Ky. Received through W. R. Burns: Archaeological and geological specimens. 37583.
- KLOSS, C. B. Received through Dr. W. L. Abbott, Singapore, Straits Settlements: Fifty-six birds' skins from the vicinity of Singapore. 37410.
- KLUMPH, W. E., Corning, Ohio: Stone pipe from Sunday Creek, Perry County. 37459.
- KNIGHT, C. H., Washington, D. C.: Head-dress of an Aushire Indian, Napo River, between Ecuador and Colombia. Purchase. 37505.
- KOBER, Dr. G. M., Washington, D. C.: Seventeen specimens of marine shells from New Mexico (exchange) (37396); old-style German clock (purchase) (37506).
- KOONS, Prof. B. F., Storrs, Conn. Salamander. Exchange. 37284.
- KOTCHIBIE, Dr., director, Imperial Survey, Japan. Received through J. E. Spurr, U. S. Geological Survey. Specimen of reinite from Kurasawa, Kai, Japan. 37675.
- KRANTZ, Dr. F., Bonn, Germany: One hundred and seventy-seven specimens of Nautiloids and Ammonoids, and a series of cephalopod models. 37399.
- KENTZELMAN, I., Bainbridge, Pa.: Fishes and a snake from Pennsylvania. 37610.
- KURTZ, H. M., Woodland, Pa.: Two fossil plants. 37878.

- LACEY, R. S., Washington, D. C.: Banner-stone from near Mount Olivet Church, Ballston, Va. 37594.
- LACOE, R. D., Pittston, Pa.: One hundred and twenty-five fossil plants from the supposed Middle Devonian at St. Johns, New Brunswick. 37174.
- LAKE, W. C., Harbor, Oreg. Received through J. S. Diller. Nodule of priceite from southwestern Oregon. 37268.
- LAMB, T. F., Portland, Me.: Cut specimen of yellow beryl, cut specimen of yellow beryl mounted in gold, and two fragments of beryl. Purchase. 36860.
- LAMBSON, G. H., Baird, Cal.: Two Pitt River Indian baskets. 36909.
- LANE, J. J., Piedmont, Mo.: Specimen of *Dynastes tityus* Linné. 37068.
- LANGILLE, H. D., Washington, D. C. Received through Department of Agriculture. Nineteen plants from Washington State. 37551.
- LANGLEY, Mr. S. P., Secretary of the Smithsonian Institution: Time-indicating lamp from Nuremberg (37342); antique scale from Paris, France (7343).
- LANSBURGH, MAX, Washington, D. C.: Cards of invitation and other papers relating to historical events (37408, 37619).
- LANT, J. A., Tarrytown, N. Y.: Old Bradford Press, pull-down jobber, star card press, ink balls, and breyers. Purchase. 36751.
- LARRABEE, R. N. (See under Deane, Walter.)
- LATHROP, A. P. (See under St. Paul Gas Light Company.)
- LAVILLE UNIVERSITY, Quebec, Canada. Received through Monsignor Dionne. Fifteen type specimens of Chamber's Tineidae. 37780.
- LAW, CHARLES, Sr., West Pittston, Pa.: Granite from Fulton County, Iowa (37821); piece of iridescent anthracite coal from Butler mine, Pittston (37862).
- LEDYARD, H. B. (See under Michigan Central Railroad Company.)
- LEE, HARRY A. (See under Mollie Gibson Mining Company.)
- LEGE, B. K., Yoakum, Tex.: Plant. 37183.
- LEHMAN, W. V., Tremont, Pa.: Three fossil plants (*Sphenopteris* sp.) from Swatara Gap, near Tremont. 37250.
- LEIDEN, HOLLAND: ROYAL GEOLOGICAL MUSEUM. Received through Prof. K. Martin, Director. Twenty-six specimens (13 species) of fossil corals from Curaçao, Bonaure, etc. Exchange. 37492.
- LELAND STANFORD JUNIOR UNIVERSITY, Stanford University, Cal. Received through Dr. D. S. Jordan. Fishes collected by N. F. Drake at Tientsin, China (37391); Japanese fishes (38029).
- LEON, Dr. NICHOLAS, care Nacional Museum, Mexico, Mexico: Thirty-eight photographs of Mexicans of different tribes in ordinary costumes. 37239.
- LEROUX, ERNEST, Paris, France: Facsimile of Codex Bourbonicus. Purchase. 37527.
- LE SAGE, Capt. J. V., Colfax, La.: Sting-snake, *Furancia abacura*, from Louisiana. 36814.
- LEWIS, H. M. See under White Dental Manufacturing Co.)
- LINDGREN, Dr. W. (See under Cartwright Brothers, and Interior Department, U. S. Geological Survey.)
- LINDSAY, L., Nogales, Ariz.: Four earthen pots; bones unearthed in the streets of Nogales. 36713.
- L'INSTRUMENTAL, Paris, France: Six musical instruments. Purchase. 38127.
- LIPPMANN, Prof. G., Paris, France: Photograph (still-life group) in natural colors, and a photograph (solar spectrum) also in natural colors. 37111.
- LITTLE, L. G., Lanthus, Ind. Received through Dr. A. K. Fisher. Five eggs of Short-billed Marsh wren, *Cistothorus stellaris*. 37455.
- LITTLE, P. J., Ebensburg, Pa.: Water-bug. 36965.
- LIVINGSTON, A. J., Butte, Mont.: Seven photographs of fossils. 37633.
- LLOYD, Mr. (See under Tracy, S. M.)

- LOCKWOOD, Mrs. Eliza, Los Angeles, Cal.: Potato Sphinx moth, *Protoparce cin- gulata* Fabr. 37026.
- LONDON, ENGLAND: BRITISH MUSEUM. (See under Agriculture, Department of.)
- LONG, W. H., jr., Austin, Tex.: Specimens of Proctotrypids. 37493.
- LOOMIS, Rev. HENRY, Yokohama, Japan: Japanese shells (36980); echinoderms, barnacles, and mollusks from Japan and adjacent territory (37393).
- LOPER, Prof. S. WARD. (See under Interior Department, U. S. Geological Survey.)
- LORING, J. ALDEN, New York City: Nine skins and skulls of mammals. 37732.
- LOUBAT, M. le Duc de, Paris, France: Received through Walter M. Gilbert, Columbia University, New York City: Six Mexican codices; Tonalamatl der Aubin'schen Sammlung; Seler: Auf Alten Wegen in Mexico and Guatemala; Codex Telleriano Remensis; Codex Vaticanus 3773; Codex Vaticanus 3738 (de Rios); Codex Borgia; Codex Bologna. 37443.
- LOUNSBURY, C. P., Government Entomologist, Cape Town, Cape Colony, South Africa: Sixty-three specimens of Diptera (27 species), principally new to Museum collection. 37979.
- LOVETT, EDWARD, Croydon, England: Set of Maundy money, A. D. 1900, the last issued by Queen Victoria. Exchange. 37650.
- Low, Capt. Thomas, Anclote, Fla.: Shrimps. 37938.
- LOWE, H. N., Long Beach, Cal.: Nine specimens (5 species) of mollusks, and a crustacean, from San Clement Island, Cal. 37972.
- LUCAS, L., Passaic, N. J. Received through Interior Department, U. S. Geological Survey: Views of the red sandstone formation near the banks of the Passaic River. 37128.
- LUNT, WILLIAM, Botanical Station, St. Kitts, British West Indies: Eleven species of land shells from Trinidad, West Indies. 37976.
- LYMAN, H. H., Montreal, Canada: Butterfly. 36719.
- LYON, M. W., jr., U. S. National Museum: Two species of land shells from San Juan, P. R. (36754); natural history specimens from the vicinity of La Guayra, Venezuela; silver, nickel, and copper coins (36930, 36943).
- LYON, R., Cherry, Ariz.: Specimens of *Dynastes grantii* Horn. 37482.
- MACGILLIVRAY, ALEXANDER, Entomological Laboratory, Ithica, N. Y.: Parasites from *Pieris rapae*, *Apanteles glomeratus* and *Tetrastichus semideus*. 37886.
- McBRIDE, Prof. T. H., Iowa City, Iowa: Specimen of *Stemonitis acifera* from Washington. Exchange. 37094.
- McCALLA, W. C., St. Catharine, Ontario: Four hundred and thirty-two plants from the northern Rocky Mountain region. 36739.
- McCASKEY, Capt. WILLIAM S., U. S. Army. (See under War Department.)
- McCLAIN, G. C., jr., Washington, D. C.: Two shells from the *Viscaya*, and a shell from the *Maria Theresa*. 37281.
- McCLURE STEAM SHIP CO., New York City: Diagram illustrating the development of the horse. 37060.
- McCOLL, W. W., Salamanca, N. Y.: Water bug (*Banacus griseus* Say). 36888.
- McCORMICK, L. M., Glen Island Museum, Long Island, N. Y.: Mammals and reptiles from Porto Rico and the Philippine Islands. 37321.
- McCORMICK, W. F. J., Cocoanut Grove, Fla.: Mouse-fish, *Pterophryne gibba*. 37340.
- McDONALD, W. H., Elizabeth, N. J.: Specimen of *Lycopodium* from New York. 37508.
- McFARLAND, Miss MARY C., Washington, D. C.: Four articles of dress belonging to the costume of a Siamese noble; 5 gold Siamese coins; 13 silver Siamese coins, and 4 Siamese copper coins. Purchase. 37364.
- McGEE, W. J., Bureau of Ethnology, Washington, D. C.: Ethnological objects obtained from the Cocopa Indians. 37787.

- McGIRE, Capt. THOMAS L., U. S. Volunteers, Misamis, Mindanao, P. I.: Comb made by the Moros (37336); an orchid and a specimen of grass from the Philippine Islands (37397); 2 specimens of *Oreum colca* L., or "Shuttle-shell," from Mindanao (37476); 20 species of marine shells from the Philippine Islands (38083); 75 species of marine and land shells from Panquil Bay, Mindanao, and other localities (38161).
- McGOWAN, SAMUEL, Charleston, S. C.: Four abnormal eggs. 38003.
- McGREGOR, R. C., Palo Alto, Cal.: Crustaceans from Alaska (37188); Pacific eider, *Somateria v-nigra* (37786).
- McGUIRE, J. D., Washington, D. C.: Sixteen worked stones, stone ax, broken arrow points, specimens of bones, from Long Pier, Castine Branch, Maine. 37247. (See under Smithsonian Institution.)
- McINTYRE, FRANK, Bohemia, Oreg.: Geological material from Bohemia. 37216.
- McKEEVER, G. W., Marion, Ohio: Water beetle. 36944.
- McKINLEY, L. L., Longview, Tex.: Mole cricket, *Gryllotalpa borealis* Burm. 37078.
- McLANAHAN, Mrs. S. C., Hollidaysburg, Pa.: Dermestid larva. 36707.
- McMULLEN, LOGAN, Jehu, Wyo.: Specimens of pink mineral from Jehu Mountain, Albany County, Wyo. 37264.
- McNARY & GAINES, Xenia, Ohio: Plant. 37685.
- McRAE, W. C., Coketon, W. Va.: Specimen of *Corydalis cornutus* Linnaeus. 36868.
- MACOUN, JOHN, Ottawa, Ontario, Canada: One hundred plants from Canada. Exchange. 37855.
- MADDREN, A. G., Port Townsend, Wash.: Five specimens of Middle Devonian corals from Alaska. 37707.
- MAIER, T. F., La Mott, Pa.: Eggs of Katydid. 37837.
- MARLATT, C. L., Department of Agriculture: Two trap-door spider nests and a spider from Lamesa, collected by Nina MARLATT, C. L.—(Continued).
- Strachass (36843); about 400 specimens of Hymenoptera from Kansas (37185).
- MARSH, Dr. H. R., Joliet, Ill.: Collection of ethnological objects, from Point Barrow, Alaska (purchase) (37830); adz head of nephrite, from Point Barrow, Alaska (gift). (38133).
- MARSHALL, ERNEST and HENRY, Laurel, Md.: Red squirrel, *Sciurus hudsonicus loquax*, and a muskrat (*Fiber zibethicus*). 37520.
- MARSHALL, GEORGE, U. S. National Museum: Tortoise (*Cistudo carolina*) from Maryland (36849); snake (37308).
- MARSHALL, HENRY, U. S. National Museum: Ground lizard (*Leiopisma laterale*) from Washington, D. C. 37285.
- MARSHALL, Dr. W. S., Madison, Wis.: Nine specimens of Diptera, including two species new to the Museum collection. 37349.
- MARSTON, B., Kearney, Nebr.: Immature membracid, and eggs of Pentatomid. 36902.
- MARTIN, H. T., Lawrence, Kans.: Fossils from Kansas. 37777. Purchase.
- MARTIN, Prof. K. (See under Leiden, Holland, Royal Geological Museum.)
- MARYE, Col. W. A., U. S. Army. (See under Fort Monroe Arsenal.)
- MASIUS, A. G. (See under Agriculture, Department of.)
- MASSIE, JOHN R., Washington, D. C.: One thousand and seventy-four birds' skins from various parts of the United States. Purchase. 37765.
- MASTA, CAROLINE, Pierreville, Canada: Collection of Abenaki Indian baskets. Purchase. 36975.
- MATCHETT, GEORGE G. and JOHN I., Philadelphia, Pa.: Specimen of soft rock containing pupal cells of a Digger bee (*Anthophora* sp.). 38005.
- MATHER, Mrs. ADELAIDE. (See under Mather, Fred. (deceased).)
- MATHER, FRED. (deceased), received through Mrs. Adelaide Mather, Brooklyn, N. Y.: Pair of snowshoes, pair of moccasins, birds' eggs, fish eggs, etc. 37279.

- MATHER, W. (no address given): Egg of California Condor, *Gymnogyps californianus*, from California. Purchase. 38115.
- MATTHEWS, Dr. WASHINGTON, U. S. Army, Washington, D. C.: Rattle, comb, and part of a loom of the cliff dwellers. 37376.
- MAXON, W. R., U. S. National Museum: Twenty plants from central New York (36726); two birds' skins from New York (36737); 15 plants from Alabama (36779); 58 specimens of insects from Alabama (36807); 48 specimens of Odonata, a fly and a beetle from central New York (36808); plant from Maryland (36937); 6 specimens of Odonata and a specimen of Myrmeleonid (36951); 2 birds' skins from New York (36940); specimen of *Ophioglossum vulgatum* from Maryland (36937); 20 specimens of dragon flies from the vicinity of Washington (37103); 25 specimens of *Myxomyces* from Virginia (37163); 20 specimens of *Myxomyces* from Maryland (37181); 16 specimens of *Myxomyces* from the District of Columbia (37190); 24 plants from New York and the District of Columbia (37566); plant (37871); 4 plants from Virginia Beach, Va. (37918).
- MAXWELL, C. W., Norfolk, Va.: Ants representing the species *Myrmica lavi-nodis* Nylander. 36775.
- MAXWELL, P. P., Davidson, N. C.: Butterfly (*Danais archippus* Fab.). 37184.
- MAYNARD, G. C., U. S. National Museum: Two specimens of submarine telegraph cables laid between the main coast of Massachusetts and Nantucket in 1856-57 (37531); specimens of iron electric conductor, telephone cable, and submarine telephone cable (37605).
- MAYRE, Col. W. A., U. S. Army. (See under Fort Monroe Arsenal.)
- MEACHAM, WILLIAM, St. Paul, Minn.: Three cockroaches. 36995.
- MEARNS, Dr. E. A., U. S. Army, Fort Adams, Newport, R. I.: Natural history specimens from Rhode Island (36984, 37318); shells and mammal skeletons (37416); five birds' skins, fish bones, barnacles, mammal skins, and a pine cone (37462); natural history specimens from the vicinity of Newport (37560); natural history specimens from Florida (37574, 37657, 37758, 37770, 37825, 37934); natural history specimens and ethnological objects from Florida (37905); natural history material from Florida (37955, 37543, 37604); nest and three eggs of Worm-eating warbler, *Helminthos vermivorus*, and egg of Cowbird, *Molothrus ater*, from Maryland (38017). (See under Ash, C. E., jr.)
- MEARNS, LOUIS DI Z., Newport, R. I.: Specimen of *Corvus americanus*; three Muskrats (*Fiber zibethicus*) and two House rats (*Mus decumanus*) (36985); mammals, birds, and reptiles (37319); two mammals (37477). Deposit.
- MEDFORD, H. C. Tupelo, Miss.: Waterbug (*Benacus griseus* Say) (gift) (36857); portion of a large fossil femur (gift) (36903); part of tibia of a Dinosaur (gift) (37141); Indian relics obtained by Lizzie Eades (purchase) (37751); acorns from Bosque County, Tex. (gift) (38066).
- MEEHAN, J. V., U. S. National Museum: Connecticut one-cent piece of the issue of 1787. 37629.
- MELTON, T. A., Manila, P. I. Received through the Department of Agriculture: Plant. 36874.
- MEREDITH, H. B., Danville, Pa.: Specimen of *Ajuga generensis* from Pennsylvania. 37666.
- MERRIAM, Dr. C. HART. (See under Harriman Alaskan Expedition.)
- MERRICK, H. D., New Brighton, Pa.: Fifty-four moths. 37714.
- MERRILL, ELMER D. (See under Agriculture, Department of.)
- MERRILL, Dr. G. P., U. S. National Museum: Unionidae from Maine (36710); limestone and residual clay from Maryland (37971).
- MESNY, A. B. LE P., Washington, D. C.: Honey barrel, or bee's nest, made by a Leaf-cutting bee (*Megachile* sp.). 37270.

- METCALF, JAMES K., Silver City, N. Mex.: Specimens of spherulites. Purchase. 37853.
- MEXICO, MEXICO: INSTITUTO-GEOLOGICO DE MEXICO. Received through José C. Aguilera. Six specimens of rocks. Exchange. 37427.
- DE MEY, DR. C. F., U. S. Army, Manila, P. I.: Received through Office of Surgeon-General, War Department. Coconut crab, *Bigus latro* Linnaeus. 37052.
- MEYER, DR. A. B. (See under Dresden, Germany. Royal Zoological and Anthropological-Ethnographical Museum.)
- MEYER, S. N., Washington, D. C.: Badge of the Confederate celebration of General Lee's birthday, and four campaign badges of Messrs. McKinley and Bryan. 37499.
- MICHEL, MARC, Romilly, Geneva, Switzerland: Nine hundred and thirty-three plants from Mexico. Purchase. 37509.
- MICHIGAN CENTRAL RAILROAD COMPANY. Received through H. B. Ledyard, president, Detroit, Mich.: Siemens galvanometer. 37861.
- MILES, MRS. CORNELIA, Denver, Colo.: Plant. 36827.
- MILLER, MRS. ELIZABETH PAGE, Peterboro, N. Y.: Frogs from New York (36948); natural history specimens from New York (37042).
- MILLER, MRS. FRANK, Washington, D. C.: Luna moth. 37978.
- MILLER, GERRIT S., JR., U. S. National Museum: Two specimens of *Phallus* from the District of Columbia (37385); about 400 natural history specimens from Peterboro, N. Y. (36921); collection of frogs from New Hampshire, Mississippi, and Virginia (36784); 13 plants from central New York (37164).
- MILLER, GERRIT S., JR., and E. A. PREBLE, U. S. National Museum: Two tree frogs from Virginia. 36952.
- MILLER, H. C., Jackson, Ohio: Five cad-dis worms. 36729.
- MILLSPAUGH, DR. C. H., Field Columbian Museum, Chicago, Ill. Received through Department of Agriculture: Plant from the West Indies. 37572.
- MINOT, A., Cedar Rapids, Iowa: Arrow-head from Atkinson, Nebr. 36923.
- MITCHELL, Hon. J. D., Victoria, Tex.: Specimen of *Callinectes sapidus* with an albino claw (37029); 3 species of shells from Texas (37621).
- MOHR, DR. CHARLES, Asheville, N. C.: Two plants. 36973.
- MOLLIE GIBSON MINING COMPANY, Denver, Colo.: Received through W. J. Cox, superintendent, and H. A. Lee, Bureau of Mines, Denver. Native silver from Colorado. 37653.
- MOLLOY, J. M., Nez Perces Agency, Spalding, Idaho: Butterflies. 36742.
- MONTAGUE, H. C., Washington, D. C.: A Burnside army carbine and a Maynard army carbine. Purchase. 37586.
- MONTANDON, A. L., Bucarest, Roumania: Three small mammals and two reptiles. 37699.
- MONTEVIDEO, URUGUAY, MUSEO NACIONAL. Received through J. Archavaleta, director: Eight bats. Exchange. 36929.
- MOONEY, JAMES. (See under Smithsonian Institution, Bureau of Ethnology.)
- MOORE, C. B., Philadelphia, Pa.: Three shell implements from Florida and South Carolina (36727); vessel found inverted over fragments of bone in a cemetery near Point Washington, Fla. (38106).
- MOORE, E. KIRK, Hampton, S. C.: Photograph of a bottle and cast of seal on bottle found in an Indian grave. 36924.
- MOORE, E. P., Enid, Oklahoma: Head of Cotton-tail rabbit. 37913.
- MOORE, FELIX T., Washington, D. C.: Five Confederate notes issued from the State of Alabama. 37299.
- MOORE, H. F. (See under Eastlake, Dr. Warrenton).
- MORGAN, BURT, Central, S. C.: Cerambycid beetle (*Orthosoma brunneum* Forster) 36873.

- MORGAN, Dr. E. L., Washington, D. C.: Gray squirrel, *Sciurus carolinensis*. 37195.
- MORGAN, G. D., Maxey, Tenn.: Reptiles and batrachians from Tennessee. 37287.
- MORGAN, Mrs. G. W., Mount Vernon, Ohio: Gold sword, pair of silver mounted pistols, two military belts, a Mexican war sword and spurs, civil war sword and spurs and five shoulder-straps. 37280.
- MORLEY, CLAUDE, Ipswich, England: Specimen of *Sphécophaga resparum* Westbrook. 37844.
- MORREY, J. B., Washington, D. C.: Two Lapp costumes. Purchase. 37704.
- MORRIS, Mrs. D. H., New York City: Horn-tailed sawfly, *Tremex columba* Linnaeus. 37582.
- MORRIS, E. L. (See under Fish Commission, U. S.; Western High School.)
- MOSS, WILLIAM, Ashton-under-Lyne, England: Five specimens of land-mollusks (3 species) from Trinidad (37406); land and fresh-water shells from Trinidad, West Indies (37977).
- MURDOCH, Miss E. P., Washington, D. C.: Five patterns of Mexican drawn work (37101); pair of old beaded moccasins from the Iroquois Indians of New York (37968).
- MUSÉE DE ST. GERMAIN. (See under Seine-et-Oise.)
- MUSÉE ZOOLOGIQUE DE L'ACADEMIE IMPERIALE DES SCIENCES. (See under St. Petersburg, Russia.)
- MUSEO NACIONAL. (See under Montevideo, Uruguay.)
- MUSEUM FÜR NATURKUNDE. (See under Berlin, Germany.)
- MUSEUM OF COMPARATIVE ZOOLOGY, Cambridge, Mass. Received through Samuel Henshaw: Copy plates of Garman's deep-sea fishes. 37559.
- NARBEL, PAUL, Cour, Lausanne, Switzerland: Forty-nine mammal skins and skulls. (37006, 37017, 37269.) Exchange.
- NASH, C. W., Toronto, Canada: Specimens of elaterid larvæ infested with *Cordyceps acicularis* Berk. and Rav. 37880.
- NASH, Dr. G. W., Kings Bridge, N. Y.: Received through Smithsonian Institution, Bureau of Ethnology. Piece of grass cloth from Kongo River, Africa. 37257.
- NATHAN, JOSEPH. (See under Smithsonian Institution, Bureau of Ethnology.)
- NATIONAL CAPITAL CENTENNIAL, Citizens' Committee. (See under Smithsonian Institution.)
- NAVY DEPARTMENT (Bureau of Equipment), Rear Admiral R. B. Bradford, Chief. Collection of ocean bottom specimens collected by the U. S. S. *Nero*. 37100.
- NEEDHAM, Prof. J. G., Lake Forest, Ill.: Five specimens of Diptera (37139); 8 specimens of parasitic Hymenoptera (37272).
- NELSON, AVEN. (See under Agriculture, Department of.)
- NELSON, E. W., Department of Agriculture: Fifteen skins and skulls of West Indian seals from Triangle Keys, Campeche, Mexico, collected by the donor and E. A. Goldman (purchase) (36783); objects from a mound in Arizona, fragments of pottery from Mexico, and Eskimo objects from the mouth of the Yukon River, Alaska (gift) (37368). (See under Agriculture, Department of.)
- NELSON, ELIAS, Washington, D. C.: Ninety-seven plants from various localities in the United States. Purchase. 37790.
- NELSON, J. H., Kahoka, Mo.: Five chipped flint specimens from Missouri. 37904.
- NEVILLE, W. R., Austin, Tex.: Hellgrammite fly, *Corydalis cornuta* Linné. 38152.
- NEVIN, Miss BLANCH, Windsor Forges, Churchtown, Pa.: Three Japanese wedding cups and two Chinese shell spoons. 37003.

- NEW MEXICO AGRICULTURAL EXPERIMENT STATION, Mesilla Park, N. Mex. Received through Prof. T. D. A. Cockerell: Two earthworms from Las Vegas (36717); flies, beetles, and wasps (36913); insects from New Mexico (36955).
- NEW YORK BOTANICAL GARDENS, Bronx Park, N. Y.: Plant from Columbia University greenhouse (37034); specimen of *Selaginella densa* Rydberg (37093); 21 plants from Colorado, collected by P. A. Rydberg (37329); 248 plants from Yukon, Alaska, collected by Mr. Williams (38002). Exchange.
- NEW YORK STATE MUSEUM, Albany, N. Y. Received through Dr. John M. Clarke: Three specimens of fossils. 36990.
- NEW YORK ZOOLOGICAL PARK. (See under New York Zoological Society.)
- NEW YORK ZOOLOGICAL SOCIETY. Received through New York Zoological Park, R. L. Ditmars: King cobra. 37730.
- NEWCOMB, B. M., Oak Hill, Cal.: Mercury in gangue from Phoenix and Karl quicksilver mines, San Luis Obispo County, Cal. 37940.
- NEWLON, Dr. W. S., Oswego, Kans.: Specimen of *Cordaites* (?) from the Cherokee shale. 38009.
- NIXON, S. D., Baltimore, Md.: Water snake, *Natrix sipedon*. 37922.
- NOLAN, W. J., Weatherfield Center, Vt. Received through Department of Agriculture: Two plants. 37151.
- NORTH AMERICAN BELGIAN HARE COMPANY, Washington, D. C. Received through J. Howard Payne: Belgian hare. 37857.
- NORTH CAROLINA STATE MUSEUM, Raleigh, N. C. Received through H. H. Brimley: Elk. Deposit. 37803.
- NORTON COMPANY, H. P., Seattle, Wash.: Skin of Glacier Bear, from Alaska. Purchase. 36953.
- NOTESTEIN, F. N., Alma, Mich.: Snake. 37794.
- NYLANDER, OLAF, Caribou, Me.: Four species of *Pisidium* from Maine. 37553.
- O'NEILL, J. A., Franklin, La. Received through Department of Agriculture: Five plants. 37152.
- OAKES, Miss F. F., Blackstone, Ill.: Cerambycid beetle, *Prionus imbricornis* Linnaeus. 36786.
- OFFER, WILLIAM, Miami, Fla.: Land, fresh-water, and marine shells. 37834.
- OLDHAM, PERRY B., Seguin, Tex.: Sixteen crayfishes (37912, 37927); 3 specimens of crayfishes (*Cambarus clarkii*) (37848).
- OLDROYD, Mrs. T. S., Los Angeles, Cal.: Two specimens of marine shells from San Pedro, Cal. 37550.
- OLDS, H. W., Washington, D. C.: Specimens of *Plantago aristata nuttallii* from Maryland. 38117.
- OLNEY, Mrs. M. P., Spokane, Wash.: Shells of *Pyramidula* from Idaho. 37545.
- ONEIDA COMMUNITY, LIMITED, Kenwood, N. Y.: Mouse trap, 6 Newhouse traps, old-style English trap, and an old-style German trap. 38088.
- ORCUTT, C. R., San Diego, Cal.: Shells and echini from Lower California (36813); 35 specimens of Cactaceae from the United States and Lower California (37229); echinoderms, crustaceans, corals, foraminifera, and mollusks, from various localities (37863).
- OSBORN, Prof. HERBERT, Ohio State University, Columbus, Ohio: Seven types of Jasside belonging to the genus *Scaphoidens*. 37354.
- OSGOOD, N. H. (See under Agriculture, Department of.)
- OSTERLOH, PAUL, Leipzig, Germany: Series of models illustrating the structure and development of a feather. Purchase. 37541.
- OTTAWA, CANADA, GEOLOGICAL SURVEY. Received through Dr. H. M. Ami: Thirty specimens of Lower Carboniferous (Windsor) limestone fossils, and 11 specimens of *Stringocephalus burtini* from Manitoba. 37491.
- OTTOLENGUI, Dr. R., New York City: One hundred and two specimens of Lepidoptera. 36763.

- OUSSANI, Rev. GABRIEL, New York City: Sixty-six Babylonian seals, 5 inscribed earthen bowls, 4 glass bottles, 2 figurines, pieces of blue tile, alabaster jar, lamp, and a carving representing a deer (the last five from southern Arabia). Purchase. 37297.
- OVERACKER, M. L. (See under Agriculture, Department of.)
- OZIAS, J. W., Lawrence, Kans.: Letters written by American soldiers from the Philippine Islands on Spanish official paper, newspapers from Manila, and ethnological objects. 37644.
- PAGE, L. W., Department of Agriculture: Two faceted pebbles, from Martha's Vineyard and Cape Cod, Massachusetts. 37801.
- PAINE, R. G., U. S. National Museum: Tree frogs from South Carolina. 38101.
- PALMER, Dr. EDWARD, Washington D. C.: Shells, crustaceans, earthworms, and geological specimens, from Mexico (purchase) (36968); small wicker basket of willow from Santa Maria del Rio, near San Luis Potosi, Mexico (gift) (37964).
- PALMER, WILLIAM, U. S. National Museum: Natural history material from Cuba (36920, 36962); two frogs (*Rana palustris*) from Maryland (36949); two birds' skins (gift) and four mountain sheep (purchase) (37413, 37414); snake, 122 plants, insects, plants, two lizards, insects, plants, and two Spanish coins, from Cuba (36740, 36757, 36781, 36787, 36741, 36916, 36981, 37016); two skins of *Ammodramus princeps*, from Smiths Island, Virginia (37515); five specimens of *Viola* from Virginia (38031); five ferns from Maryland and Virginia (38039); Woodchuck, *Arctomys monax* (38065); two birds' nests from Virginia (38067); two specimens of *Poliophtila cerula*, with nest and 8 eggs (37625); salamander from Virginia (38100).
- PARISH, S. B., San Bernardino, Cal.: Plants from California (36821, 37437, 38025). Gift and exchange.
- PARSONS, F. R., Providence, R. I.: Four eggs of an albino specimen of the Three-toed woodpecker, *Picoides americanus dorsalis*, from Arizona. 37768.
- PATTERSON, Rev. B. CRAIG, Barterbrook, Va.: Ghost-head, or ant-nose coin of China, issued 612-589 B. C. 38052.
- PAXSON, H. D., Philadelphia, Pa.: Pottery, lamps, tinder boxes, etc., from Holland and Pennsylvania. Exchange. 37210.
- PAYN, E. J., Olympia, Wash.: Specimen of gold-silver ore from Okanogan district, Washington. 37426.
- PAYNE, J. HOWARD. (See under North American Belgian Hare Company.)
- PEABODY, Mrs. H. M. (See under Smithsonian Institution, Bureau of Ethnology.)
- PEARSE, A. S., Omaha, Nebr.: Natural history specimens from East Pryor Creek, near Billings, Mont. 37607.
- PEASE, G. H., Placer, Oreg.: Ammonite and 2 specimens of *Trigonia* from the Cretaceous rocks on Grave Creek, Jackson County, Oreg. 37897.
- PECK, Prof. C. H., Albany, N. Y.: Specimen of *Viola* from New York. 37203.
- PECK, W. J., Pittston, Pa.: Rolled coal bowlder from Mount Lookout Shaft, Wyoming, Pa. 38157.
- PENNYPACKER, C. F., West Chester, Pa.: Specimen of cumingtonite. Purchase. 37829.
- PERDEW, G. M., Cumberland, Md.: Eleven specimens of fossils. Exchange. 37120.
- PERIOLAT, C. F., Chicago, Ill.: Skin and skull of a Gray wolf from Alaska, and a pair of horns of the Giant moose of Alaska. Purchase. 37167.
- PETERSEN, H. P., Washington, D. C.: Two cut opals from Mexico, and 12 cut "matrix turquoise" from New Mexico. 38023.
- PHILADELPHIA ACADEMY OF SCIENCES, Philadelphia, Pa.: Two bats (*Chitongeteris*). Exchange. 37323.
- PHILADELPHIA COMMERCIAL MUSEUM, Philadelphia, Pa.: Twenty-five specimens of violets from different sections of the United States. Exchange. 37053.
- PHILLIPS, Mrs. IMOGENE. (See under Smithsonian Institution, Bureau of Ethnology.)

- PHILLIPS, J. W., Hailey, Mo.: Fungus. 37200.
- PIDGEON, H. and A. E. Stanfield, Fort Wrangel, Alaska: Five photographs of black Alaskan sheep (*Ovis stonci*). Gift for Pan American Exposition. 37386.
- PIDGEON, H., Fort Wrangel, Alaska.: Skin and skull of black Alaskan sheep. 37450.
- PIGORINI, LUIGI, director, Musei Preistorico-Ethnografico, Rome, Italy: Two full-sized photographs of the gilded Atlatl, from ancient Mexico. Exchange. 37965.
- PINCHOT, GIFFORD. (See under Agriculture, Department of.)
- PIPER, C. V., Pullman, Wash.: Seven plants. Exchange. 37073.
- PIPER, Miss M. G., U. S. National Museum: Specimen of *Alaus oculatus*. 38119.
- PITCHER, JAMES R., Shorthills, N. J. (received through Department of Agriculture): Plant. 37274.
- PITTIER, H., San José, Costa Rica, Central America: One hundred and fifty-six plants from Costa Rica. Purchase. 38024.
- PITTSBURGH REDUCTION COMPANY, Pittsburgh, Pa.: Ten pieces of bare and insulated cable. 37067.
- PLANK, E. N., Decatur, Ark.: Four plants (36731); plant from Texas (37952). (See under Agriculture, Department of.)
- PLUMACHER, EDWARD. (See under Smithsonian Institution.)
- POLING, O. C., Quincy, Ill.: Two specimens of *Neophasiaterfootii* Behr (37258); 30 specimens of Lepidoptera (37328).
- POLLARD, C. L., U. S. National Museum: Fifty-eight insects (36807); 6 specimens of Odonata and a Myrmeleonid (36951); 3 specimens of Odonata from New Jersey (36950); 15 plants from Alabama (36779); 50 plants from the District of Columbia (37908); salamander from Slide Mountain, New York (38028); 200 plants from North Carolina (38030); 50 plants from New York (38086); 5 birds from North Carolina (38150).
- POTTER, C. L., Rumford Point, Me.: Slab of muscovite. 37084.
- PRATHER, J. K., Waco, Tex.: Collection of Cretaceous fossil vertebrates. 36712.
- PRATT, J. H., Chapelhill, N. C.: Specimen of pseudo meteoric iron from Davidson County, N. C. (37784); specimens of corundums from Canada, tourmalines, feldspars, lepidolite, scheelite, and wolframite from various localities in New England (37352).
- PRATT, P. H., East Bridgewater, Mass.: Wampum and arrow points. 37251.
- PREBLE, E. A., Biological Survey, Department of Agriculture: Frog from Virginia. 37288. (See under Agriculture, Department of; Miller, Gerit S., jr.)
- PREBLE, E. A. and A. E. (See under Agriculture, Department of.)
- PREVOST, VICTOR. (See under Rosch, John, and Scandler, W. I.)
- PRICE, Miss S. F., Bowling Green, Ky.: Two species of shell from Kentucky. 36964.
- PRIEST, B. W., Bank House, Keeppham, Norfolk, England: Foraminifera from the West Indies and Ireland. Exchange. 37991.
- PRINGLE, C. G., Charlotte, Vt.: Seventy-seven Mexican plants (purchase) (36761); 300 Mexican plants (purchase) (37469). (See under Gray Herbarium.)
- PROUDFIT, ROBERT, U. S. National Museum: U. S. infantry button, explosive bullet, minie rifle bullet from Bennings, D. C. (37363); stone hatchet, or gouge, stone tablet with notched edge from near Bennings (37719).
- PRUETT, G. H., Washington, D. C.: Scorpion, *Centrurus carolinianus* Beaur. 38096.
- PURINGTON, C. W. (See under Interior Department, U. S. Geological Survey.)
- PURPUS, C. A., San Diego, Cal.: Eighty-seven plants from Lower California. Purchase. 37317.
- RALPH, Dr. W. L., U. S. National Museum: Eighteen birds' eggs and 3 nests from Grand Manan, New Brunswick (36932); 88 birds' eggs from various

RALPH, Dr. W. L.—Continued.

localities in the United States (37742); 4 eggs of Hudsonian chickadee, *Parus hudsonicus*, and 2 crocodile eggs from Florida (37452); 74 birds' eggs and 9 nests from Grand Manan, New Brunswick (37867); egg of the Mississippi kite, *Icterus mississippiensis*, from South Carolina (37868); bird skins and 4 birds' eggs from Florida (37894); nest and 6 eggs of Tufted titmouse, *Parus bicolor*, from the District of Columbia (37975); 4 eggs of Wood thrush, *Hylocichla mustelina*, from the District of Columbia (38006); 13 birds' eggs and 3 nests from the District of Columbia (38018); 22 birds' eggs and a bird skin from Florida (38040); egg of a California condor, *Gymnogyps californianus*, from California (38122).

RANDALL, F. A., Warren, Pa.: Devonian and Lower Carboniferous invertebrates (37129); 3,421 specimens of Devonian and Carboniferous fossils (36935); Devonian and Carboniferous fossils and plants (36935).

RANSOME, F. L., Washington, D. C.: Native tellurium from Good Hope mine, near Vulcan, Gunnison County, Colo. 37776.

RATHRAY, B. F., Washington, D. C.: Specimen of *Limulus*. 36987.

RAWLINGS, STUART L., San Dimas, Durango, Mexico: Two specimens of Membracids (*Umbonia* sp.). 37369.

READ, A. M., Washington, D. C.: Watch manufactured in France by Romilly about the year 1240. 36891.

REASONER, E. N., Oneco, Fla.: Plant. 37735.

REDIESKE, PAUL, Superintendent Lincoln Park, Chicago, Ill.: Two photographs of Rocky Mountain sheep. 37686.

REED, JOHN A. (no address given): Badge of the Independent Order of Good Americans, Baltimore, Md. 38648.

REEDER, JOHN T., Calumet, Mich.: Eight specimens of silver and copper ores (purchase, Buffalo Exposition) and 2 specimens of copper (gift). 37697.

REEVES, JAMES A., Joplin, Mo.: Burlington formation crinoid. 38044.

REHN, J. A. G., and A. N. CAUDELL, Department of Agriculture: Nineteen specimens of *Rynchota* and a grasshopper. 37421.

REMINGTON ARMS COMPANY, Received through M. Hartley, president, New York City: Double rifle hammerless shotgun, military magazine rifle, Remington rifle, and a Remington double Derringer. 37963.

REVERCHON, J., Rose Cottage, Dallas, Tex.: Five plants. 36810.

REYNOLDS, LAWRENCE R., Cocorit, Sonora, Mexico: Twenty-seven specimens, 6 species, of fresh-water shells, from the delta of the Yaqui River, near Cocorit. 37882.

RICHARDS, J. W., Lehigh University, Bethlehem, Pa.: Two specimens of wavelite in clay and a specimen of axinite. 37916.

RICHARDS, W. M., Talent, Oreg.: Two teeth of a horse, probably representing a fossil species. 37981.

RICHARDSON, H. E., Manchester, N. H.: Two Forficulae (*Labia minor* Linnaeus). 37348.

RICHARDSON, JAMES, and SONS, Kingston, Ontario, Canada: Feldspar from the quarries of Feldspar, Kingston County. 38047.

RIDDLE, A., Government Printing Office, Washington, D. C.: Spider (*Dolomedes scriptus* Hentz). 36708.

RIES, Dr. HEINRICH, Cornell University, Ithaca, N. Y.: Iron ores and rocks from Europe. Purchase. (37180, 37215.)

RILEY, J. H., U. S. National Museum: Snake (36740); plants, insects, lizards, from Cuba (36757, 36781, 36787, 36741, 36916, 36962, 36981); specimen of *Sciurus carolinensis* (37813); natural history specimens from Cuba (36920); 2 eggs of Broad-winged hawk from Virginia (37974); 2 eggs of *Buteo latissimus* from Virginia (38043).

RIVERS, J. J., Ocean Park, Cal.: Twelve specimens of Pleistocene fossils from Los Angeles County. 37320.

ROBB, M. L., Tonku, China: Leaf insect from Guinjaras Islands, Philippine

- ROBB, M. L.—Continued.
group, found by Louis Jehmenson (37263); 46 miscellaneous specimens of insects (38053).
- ROBBINS and APPLETON, New York City: Vanguard and Maximus watch movements. Purchase. 38175.
- ROBERTS, W. J., Branchton, Pa.: Weevil (*Eurymycter fasciatus* Oliver). 37056.
- ROBINETTE, W. W., Robinette, Tenn.: Seventeen sponges (37156); 50 specimens of Ordovician fossils and 40 specimens of Lower Carboniferous fossils (38081). Purchase.
- ROBINSON, Capt. WIRT, U. S. Army, West Point, N. Y.: Birds' skins, nests, and eggs from Venezuela (37567); skins and skulls of mammals, and a bat (*Glossophaga sorocinia*), from Venezuela (37887, 38116).
- ROCKWELL, J. E., U. S. National Museum: Facsimile of the New England Courant, dated February 11, 1723. 37643.
- ROEBLING, W. A., Trenton, N. J.: Eleven specimens of stilbite, 5 specimens of hydromica, clarkeite, 1 specimen of epidote, 1 specimen of tourmaline, and 2 specimens of pectolite. 37800.
- ROGERS, Rev. E. E. (See under Hulbert, H. B.)
- ROON, G. Van, Rotterdam, Holland: Sixty-one specimens of exotic Coleoptera. Exchange. 37565.
- ROSCH, JOHN, White Plains, N. Y.: Calotype negative made by Victor Prevost. 36889.
- ROSENBERG, W. F. H., London, England: Twenty-three mammal skins (36880); 15 birds' skins from Ecuador and New Zealand (37337). Purchase.
- ROSENSTOCK, Dr. EDWARD, Gotha, Germany: Eighty-three plants from Europe. 37744. Exchange.
- ROWAN GRANITE COMPANY, Woodside, N. C.: Two cubes of granite from a quarry at Granite, near Salisbury. 37983.
- ROWELL, J. G., Claremont, N. H.: Beans infested with insects. 37334.
- ROYAL BOTANICAL GARDEN. (See under Sibpur, Calcutta, India.)
- ROYAL GEOLOGICAL MUSEUM. (See under Leiden, Holland.)
- RUFFIN, Hon. H. N. (See under Foster, W. T.)
- RUST, H. N. (See under Smithsonian Institution, Bureau of Ethnology.)
- RUTH, A., Knoxville, Tenn. Received through T. H. Kearney, jr. Plants. 37743.
- RYDBERG, P. A., Bronx Park, N. Y.: Plants from Washington and Colorado (37668, 37854). (See under New York Botanical Garden.)
- ST. PAUL GAS LIGHT COMPANY, St. Paul, Minn.: Received through A. P. Lathrop, general manager. Two samples of underground cable and a line insulator. 37405.
- ST. PETERSBURG, RUSSIA, MUSÉE ZOOLOGIQUE DE L'ACADEMIE IMPERIALE DES SCIENCES. Received through W. Salensky: Seven rodents. Exchange. 36793.
- SALENSKY, W. (See under St. Petersburg, Russia, Musée Zoologique de L'Academie Imperiale des Sciences.)
- SALTZTEIN, A. L., Washington, D. C.: Watch. 36908. Purchase.
- SAMSON, H. W., Washington, D. C.: Badge issued by the Pan-American Exposition. 37597.
- SANDBERG BOTANICAL EXCHANGE BUREAU, Minneapolis, Minn.: Nineteen plants from various localities. 37623.
- SANDERS, R. F., Dawsonville, Ga.: Sphinxmoth, *Chorocampa tersa* Linné. 37138.
- SANDERS, T., jr., Newark, N. J.: Specimen of massive granite from Minerva, N. Y. 37919.
- SANDOS, W. A., Opelousas, La.: Locustid. 37230.
- SARGENT, Prof. C. S., Jamaica Plains, Mass.: One hundred plants from the United States. 37674.
- SAUNDERS, M. B., South Norwalk, Conn.: Long-sting, *Thalassa lunator* Fabr. 36798.

- SAUNDERS, W. E., London, Ontario, Canada: Fourteen plants from Ontario, Canada. Exchange. 37207.
- SCANDLER, W. I., New York City: Calotype negative made by Victor Prevost. 36889.
- SCANLAN, Mrs. M., White Hills, Ariz.: Geological specimen from Arizona. 37575.
- SCARBOROUGH, R. B., Conway, S. C.: Photograph of a whale. 37327.
- SCHEIB, Rev. K., Lawrenceburg, Ind.: Leaf-shaped blade of flint from a mound near Lawrenceburg. Exchange. 37236.
- SCHELLWEIN, Dr. E., director, Provinzial Museum, Königsberg, Prussia: Forty-six specimens of Carboniferous brachiopods (21 species). Exchange. 37929.
- SCHENCK, JOHN T., Cumberland, Md.: Thirty specimens of Helderbergian and Oriskanian fossils from Cumberland. Exchange. 38155.
- SCHERFFIUS, JACOB, Winona, Minn. Received through Hon. J. A. Tawney. Geological specimen found on the Wisconsin side of the Mississippi River. 37823.
- SCHMALENSEE, M. (See under Interior Department, U. S. Geographical Survey.)
- SCHNABEL, C. L., Portland, Oreg.: Bronze button made from the borings of a cannon captured by the Second Oregon Regiment at San Ysidore, near Manila, Philippine Islands. 36820.
- SCHRADER, F. C., Washington, D. C.: Plants from Alaska. 37088.
- SCHUCHERT, CHARLES, U. S. National Museum: Silurian and Devonian fossils from Windsor and Arisaig, Nova Scotia; Dalhousie, New Brunswick, and Gaspe, Quebec (36942); 300 Lower Helderberg fossils from Cumberland, Md., and Keyser, W. Va. (37123); 50 fossils from the Manlius formation at Buffalo, N. Y.; 50 from the Niagara at Lewiston, Pa.; 130 from the Helderberg at Lewiston, Pa., and 275 from the Helderberg at Bloomfield, Pa. (37948); water limestone from the Upper Silurian, north
- SCHUCHERT, CHARLES—Continued.
Buffalo, N. Y. (37931); about 10,000 pieces of Cincinnati fossils (exchange) (38014); about 400 specimens of Helderbergian fossils from localities in eastern Pennsylvania (38015); Helderbergian and Oriskanian fossils from western Maryland (38154).
- SCHWARZ, E. A. and H. S. BARBER, U. S. National Museum. Reptiles from Arizona. 38046.
- SEABORNE, C. R., Gallup, N. Mex.: Lizard. Purchase. 36982.
- SEAL, W. P., Delair, N. J.: Eleven eggs of a Bull snake, *Pituophis melanoleucus*, from New Jersey. 36850.
- SEEGER, G. A., U. S. National Museum: Snake (*Tropidonotus sipedon*) from Maryland (36753); 2 snakes from Maryland (37286).
- SEINE-ET-OISE, FRANCE, MUSÉE DE ST. GERMAIN. Cast of a Lychenarion, hermaphrodites, 2 silver casseroles, and galvanic reproduction of gems, comprising 15 specimens. Exchange. 37547.
- SEIP, A. N., Washington, D. C.: Five specimens of "shin-plasters," or "State script." 36841.
- SELLARDS, E. H., University of Kansas, Lawrence, Kans.: Six pieces of Oread limestone containing *Fusulina*. 37303. (See under Kansas, University of.)
- SEMPERS, J. FORD, Aikin, Md.: Birds' skins and birds' eggs, from Maryland and Massachusetts. 37345.
- SETON-KARR, H. W., Wimbledon, London, England: Collection of chipped flints from quarries in Egypt. 37154.
- SHACKELFORD, Mrs. R. S., The Dalles, Oreg.: Klickitat Indian woman's dance dress; dance dress of a Klickitat woman, with rows of beading and pendants; also 20 ethnological objects obtained from the Klickitat, Cowlitz, and Skokomish Indians (purchase) (37147); 2 sally bags made by the Wasco Indians of Washington (gift) (37802); basket material and a basket made by the Wasco Indians (gift) (37002).

- SHARP, DR. DAVID. (See under Cambridge University.)
- SHARP, J. H. (See under Smithsonian Institution, Bureau of Ethnology.)
- SHARPE, PROF. R. W., Dubuque, Iowa: Normal and pathologic Unionidae from Dubuque. 36878.
- SHELDON, E. P. (See under Agriculture, Department of.)
- SHELLACK, DR. E. H., Galena, Kans.: Specimen of Upper Silurian (Niagara) coral of the genus *Favosites*. 37924.
- SHEPARD, DR. C. U., Pinehurst, S. C.: Specimen of meteorite from Warren County, Mo. Exchange. 37797.
- SHEPHERD, T. M., Grady, Tex.: Skulls of Gray fox (*Urocyon*), Coon (*Procyon*), and Wild-cat (*Felis*) (37957); skin of a wolf (37795).
- SHERMAN, FRANKLIN, JR., Department of Agriculture, Raleigh, N. C.: Five galls of *Andricus tubicola*. 37401.
- SHRADER, F. C. Received through Department of Agriculture: Plant from Russia. 38125.
- SHUBERT, A. B., Chicago, Ill.: Carved wooden bowl. Purchase. 37142.
- SHUFELDT, MISS M. A., Morristown, N. J.: One hundred and ten specimens of oriental art from China, Japan, and Korea. Purchase. 38151.
- SHUFELDT, PERCY, Washington, D. C.: Seven specimens of the genera *Orizomys* and *Microtus*. 37461.
- SIBPUR, CALCUTTA, INDIA, ROYAL BOTANICAL GARDEN: One hundred and ninety-one plants from India. Exchange. 36963.
- SILVER, A. B., Halifax, Nova Scotia: Two specimens of *Salmo salar autumnalis*. 37338.
- SIMPSON, C. T., U. S. National Museum: Land and fresh-water shells, from Haiti. 37521.
- SINGER, COMMANDER FREDERICK, U. S. Navy, Inspector, Seventh light-house district, Key West, Fla.: Specimen of Blenny and a Pipe-fish. 37932.
- SISE, PORTER, DAVIS, W. Va.: American bittern, *Botaurus lentiginosus*, from West Virginia. 37148.
- SIRDEFIELD, REV. A. C., Melbourne, Fla.: Two Lubber grasshoppers, *Dictyophorus reticulatus* Thunb. 37738.
- SKIFF, F. J. V. (See under Field Columbian Museum, Chicago, Ill.)
- SLADE, G. T., Dunmore, Pa.: Cylinder, crossheads, and four eccentric rods of the locomotive "Stourbridge Lion." 37788.
- SLATER, MISS S. R., Moulmein, Burma, India: Custard-apple seeds from Burma. 37202.
- SLOCUM, CAPT. JOSHUA, Newport, R. I.: Stone ax found at Manley, near Sydney, Australia. 36871.
- SLOSSON, MRS. A. T., New York City: Four specimens of parasitic Hymenoptera, including two species new to the Museum collection (37217); 37 specimens of Diptera from Biscayne Bay, Florida, principally new to the Museum collection, and one representing a new genus (37774); 11 specimens of parasitic Hymenoptera (37846).
- SMALL, H. B. Hamilton, Bermuda: Two plants from Bermuda. 38055.
- SMALLWOOD, MISS M. E., Cold Spring Harbor, L. I.: Specimens of *Talorchestia*. 36826.
- SMITH, E. A. (See under Godman, F. Du Cane.)
- SMITH, FRED., Wolverine Copper Mine, Houghton County, Mich.: Specimens of moneykite and mohawkite from Wolverine Copper Mine. 37366.
- SMITH, GEORGE D., New York City: Letters and other documents relating to the inventions of J. Ericsson. Purchase. 36755.
- SMITH, DR. H. C., Auburn, Wash.: Dipterous larva. 37529.
- SMITH, DR. H. M., U. S. Fish Commission: Specimen of *Lampsilis ligamentrinus gibbus* from Arkansas (36730); 44 specimens (5 species) of land shells from Rome, Italy (37380).
- SMITH, PROF. J. B., New Brunswick, N. J.: Four specimens of *Chrysocharis oscinidis* Ashm. (37737); 6 types of Noctuid moths (37773).
- SMITH, J. D., Baltimore, Md.: Plant from Guatemala. 37580.

SMITH, Rev. P. J., Beatty, Pa.: Specimen of *Cephalothrips coloradensis*. 36794.

SMITH, W. D., Prophetstown, Ill.: Cecropia Moth, *Attacus cecropia* Linnaeus. 38168.

SMITHSONIAN INSTITUTION, Mr. S. P. Langley, Secretary.

Collection of 873 medals and 29 coins. Received from Mr. Henry Adams, Washington, D. C. 37081. Deposit.

Three pieces of native Bicol armor, 3 bolos, signal torch, 3 spears, 2 bows, 15 arrows, bird trap, fish basket, war club, sword, and wooden shield. Received from Brig. Gen. James M. Bell, U. S. V., Military Governor, Nueva Caceres, Philippine Islands. 37548.

Medal struck to commemorate the one hundredth anniversary of the establishment of the seat of government in the District of Columbia. Received from the Citizens' Committee. 37589.

Lafayette medal. Received from Mr. C. E. Claghorn, Philadelphia, Pa. 37997.

Two human skulls, powder flask, syringe, telephone, 2 horns and 2 hunting bags, 7 birds' skins, etc., from Batanga Cameroons, West Africa. Received from Dr. N. H. D. Cox, Baltimore, Md. 37614.

Medal struck in commemoration of the dedication of the capitol of the Territory of Arizona. Received from Hon. O. L. Geer, Phoenix, Ariz. 37688.

Collection of stone implements from Potomac-Chesapeake-tide-water-province. Received from Mr. J. D. McGuire, Ellicott City, Md. 37330.

Skull, bows, arrows, and spears used by the Motilou Indians, and a collection of skulls and pottery from La Hoyada. Received from Mr. Edward Plumacher, United States consul, Maracaibo, Venezuela. 36732, 37331.

Transmitted from the Bureau of Ethnology, Maj. J. W. Powell, Director: Alaskan totem pole obtained through Iver Fougner (36752); leaf-shaped

SMITHSONIAN INSTITUTION—Continued.

blades of gray flint, from a mound in Scott County, Ill. (36777); 30 leaf-shaped flints from a cache in Jackson County, Ind. (36778); 30 plants collected by Dr. Walter Hough in Arizona during his connection with the Fewkes expedition (37127); collection of Bella Coola objects and natural history specimens received from Iver Fougner (37021); 113 ethnological objects from southern California received from H. N. Rust (37098); wooden carving of Zuñi war god, wooden carving of Zuñi wargoddess, Pueblo vases and fragments, stone fetish of the Zuñis, miscellaneous stone implements, and 10 molds of aboriginal relics (36918); received from Mrs. H. M. Peabody, Navajo woman's dress (37161); 3,215 relics from the Etowah Mounds and vicinity, Bartow County, Ga. (37113)^a; relics comprising 16,756 specimens from mounds on the Davis plantation (old Evans place), Burke County, Ga. (37114)^a; relics from mounds in various places, comprising 36,514 objects 37115)^a; received through Mr. W. H. Holmes, quarry refuse from Indian quarries (37341); 4 baskets manufactured by the Cherokee Indians and some wooden spoons, collected by James Mooney on the Cherokee Reservation, N. C. (37412); 5 baskets made by Palomas Apache Indians (37474); Tarumari Indian mummy (37556); received through J. H. Sharp 11 oil paintings of American Indians, Sioux, Cheyenne, and Crow tribes (37595); received from Lieut. G. T. Emmons, U. S. Navy, arrow heads, spear points, stone celts, etc., from Spring Island, British Columbia (37766); 18,907 stone implements from aboriginal village sites in Georgia (38007); received through Joseph Nathan, ethnological and archaeological objects from California (38162); through J. M. Hoge, carved stone pipe from Virginia (38169); through J. C. Brennan, 100 stone implements

^a These specimens were originally deposited in the National Museum by Dr. Roland Steiner, Grove-town, Georgia, in previous years, and have since been purchased from him by the Bureau of Ethnology.

SMITHSONIAN INSTITUTION—Continued.

from Jamaica (38170); through Mrs. Imogene Phillips, drawing of a ruined temple in Yucatan (38171); through Mrs. J. W. Bardsollar, belt formerly worn by Chief Sitting Bull (38172); through Dr. C. W. Branch, stone implements and pottery from the West Indies (38173). (See under Nash, Dr. George W.)

Transmitted from the National Zoological Park, Dr. Frank Baker, Superintendent:

Zebu (*Bos indicus*), tapir (*Elasmognathus*) (36769); snake (*Epicrates inornatus*) (36774); leopard (*Felis pardus*) and porcupine (*Erethizon dorsatus*) (36977); snake (*Epicrates inornatus*) from Porto Rico (37013); snake (*Crotalus horridus*) from West Virginia (37014); snake (*Crotalus horridus*) from North Carolina (37015); *Macacus cynomolgus* and *Cupromys pilorides* (37039); snake (*Boa constrictor*) (37040); iguana (*Stenosaura teres*) from Mexico (37041); Douroucouli monkey (*Nyctipithecus azarae*), porcupine (*Erethizon dorsatus*), kangaroo (*Macropus ruficollis bennetti* (?), kit fox (*Vulpes velox*) (37108); 3 specimens of *Orcortyx pictus plumiferus* and a specimen of *Dendronessa gale-riculata* (37221); buffalo (*Bison americanus*), gopher-snake (*Spilotes corais couperi*), Lanzaroot pigeon (*Columba*), gannet (*Sula bassana*) (37253); parrot (*Amazona viridigenalis*) (37265); rabbit (*Lepus americanus harrisi*), spider-monkey, *Ateles ater* (37277); crocodile, from Venezuela (37307); iguana (37301); peccary (*Dicotyles labiatus*), beaver (*Castor canadensis*) (37420); lizard and a snake (37439); mule deer (*Ovis montanus*) and a moose (*Alces americanus*) (37513); duck hawk (37577); baboon (*Papio*) (37671); peccary (*Dicotyles tajacu*) (37661); Cuban deer (*Odocoileus*) (37660); moose (*Alces americana*) (37662); sea lion (*Zalophus californicus*) (37663); *Boa constrictor*, from Para, Brazil (37670); crocodile (37781); puma (*Felis concolor*), skunk (*Clinchus*), gray squirrel

SMITHSONIAN INSTITUTION—Continued.

(*Sciurus carolinensis*) (37812); parrot (*Amazona salvini*) (37925); 3 young lions and a sloth (37992); alligator from Florida (38108); cormorant (38148); swan (*Cygnus gibbus*) (38149).

SNODGRASS, R. E., Palo Alto, Cal.: Two hundred and sixteen specimens of Diptera from the Galapagos Islands. 37638.

SNYDER, A. J., Belvidere, Ill.: Eight butterflies. 37725.

SNYDER, J. O., Stanford University, Cal.; Reptiles and batrachians from California. 37375.

SNYDER, N. R., United States consul, Port Antonio, Jamaica, West Indies: Two stone celts and a polished pebble from Priestmans River, northeastern coast of Jamaica. 37426.

SPENCER, A. L., Oenaville, Tex.: Long-horn beetle, *Callichroma plicatum* Lec. 38140.

SPIES, ALBERT, Newark, N. J.: Cecropia Moth, *Attacus cecropia* Linnæus. 38145.

SPRATT, Prof. C. C., Bridgton Academy, North Bridgton, Me.: Two specimens of Myriapods. 37273.

SPRENDALL, A. E., New Berlin, Ohio: Beetle. 36900.

SPRINGER, FRANK, East Las Vegas, N. Mex.: Large slab covered with *Urtacrinus socialis*, a Cretaceous crinoid. 37514.

SPURR, J. E. (See under Interior Department, U. S. Geological Survey.)

STABLER, J. P., Sandspring, Md.: Two Red-tailed hawks (37344, 37440); Sparrow-hawk (37900).

STANDINGER, Dr. O., and A. BANG-HAAS, Dresden, Germany: Seventy-seven butterflies. Purchase. 37116.

STANFIELD, A. E., and H. PIDGEON, Fort Wrangel, Alaska: Five photographs of Black Alaskan sheep (*Ovis stonoi*). 37386.

STANGL, Dr. P. L., Luzon, Bacoar, Philippine Islands: Insects from the Philippine Islands (36867, 37077, 37140); insects and invertebrates (37157); insects (37300, 37490, 37716); reptiles and

- STANGL, Dr. P. L.—Continued.
batrachians from Cavite Province (38036); insects (38049); shell of *Murionium* (38165).
- STANTON, T. W. (See under Jones, A. W.)
- STANTON, Mrs. Gen. WILLIAM, Fort Riley, Kans.: Basket from Fort Sill, Okla., made by an Apache Indian. 37616.
- STEARNS, J. B., Camden, Me.: Pottery from ancient graves in Chiriqui. Exchange. 37866.
- STEARNS, Dr. R. E. C., Los Angeles, Cal.: Specimens of *Vallonia pulchella* Müller. 37000.
- STEELE, E. S., Washington, D. C.: Plants. Purchase and gift. (36747, 37232, 37260.)
- STEELE, W. C., Switzerland, Ga.: Received through Department of Agriculture. Plant from Florida. 37361.
- STEERE, Prof. J. B., Ann Arbor, Mich.: Ethnological objects obtained from the Jamamadys Indians on the Purus River, Brazil (purchase) (37902); mammals, reptiles, fishes, and invertebrates from the Amazon River region, Brazil, collected for the Pan-American Exposition (37996); 13 birds' skins from Brazil (purchase) (38135).
- STEINER, Dr. ROLAND, Grovetown, Ga.: Two fish baskets (36750); old-style piggin and a deerskin trunk (36910); wooden mug (37136); 3 fish traps (38146). (See under Smithsonian Institution, Bureau of Ethnology.)
- STEJNEGER, Dr. LEONHARD, U. S. National Museum: Lizard from Virginia. 38035. (See under Agriculture, Department of; Grebniński, N. A.)
- STEJNEGER, Miss Thora, Department of Agriculture: Twelve mammals from Norway. Purchase. 37646.
- STEPHENS, J. H., Jacksonville, Fla.: Part of a tooth of a southern mammoth. 37062.
- STERLING, Dr. E. C., Director, Adelaide Museum, Adelaide, Australia: Forty-seven photographs of native Australians. 37888.
- STEVENS, CHARLES, Columbus, Kans.: Galena and sphalerite with calcite crystals from Stephens Brothers' mine, Peacock City, Kans. 37941.
- STEVENSON, J. A., Miami, Fla.: Land shells from the Bahamas (36788); about 40 specimens, 12 species, of marine shells from Florida (37517).
- STEVENSON, Mrs. M. A. (See under Graham, D. D.)
- STEWART, ALBAN, Jefferson Barracks, Mo.: Vertebrate fossils from Missouri. 37551. (See under Wood, Levi.)
- STEWART, GUY, College Park, Md.: Fern. 36773.
- STONE, WITMER, Academy of Natural Sciences, Philadelphia, Pa.: Specimen of *Viola affinis* from Pennsylvania. 38087.
- STOVER, O. O., Westbrook, Me.: Received through Dr. L. O. Howard: Five specimens of Neuroptera and two of Hymenoptera. 37710.
- STRACHASS, NINA. (See under Marlatt, C. L.)
- STROTHER, W. L., Vicksburg, Miss.: Chrysomelid beetle (*Cryptocycla aurichalcea* Fab.). 38051.
- STURTEVANT, R. D., Augustin, Ala.: Portion of a meteorite which fell at Selma; collected by J. W. Coleman. 37563.
- STURTZ, B., Bonn, Germany: Thirty-eight European cephalopods. Purchase. 37223.
- SUTTLE, J. FREEMAN, Felix, Ala.: Portion of a meteorite which fell at Selma; collected by J. W. Coleman. 37562.
- SWANEY, Miss MARY. (See under Foster, W. T.)
- SWETT, Miss ANNIE K., Washington, D. C.: Coccinellid beetle, *Anatis 15-punctata* Oliv. 38050.
- SYDNEY, AUSTRALIA, AUSTRALIAN MUSEUM: One thousand and seventeen specimens of marine, fresh-water, and land shells (204 species); two specimens of *Dinolites mülleri*. Exchange. 38034.
- SYDNEY, NEW SOUTH WALES, BOTANIC GARDENS. Received through Department of Agriculture: Eighty-two plants from Australia. Exchange. 36758.
- SYDNEY, NEW SOUTH WALES, DEPARTMENT OF MINES AND AGRICULTURE: Parasitic Hymenoptera. 37106.
- TARTAGLI, A., Brozzi, near Florence, Italy: Mammal skins. Purchase. 37860.

- TASSIN, WIRT, Washington, D. C.: Sapphire graver, sapphire file, and two pieces of uncut sapphire. 37434.
- TAWNEY, Hon. J. A. (See under Jacob Scherffius.)
- TAYLOR, C. B., Kingston, Jamaica: Two bats. 37197.
- TAYLOR, E. (See under Agriculture, Department of.)
- TAYLOR, Rev. G. W., Nanaimo, B. C.: Specimens of *Lasaea rubra* Mtg., and *Phyllaphysia taylori* Dall, from near Nanaimo, B. C. 37244.
- TAYLOR, Dr. L. M., Washington, D. C.: War club with stone head of catlinite, probably Samoan. 37249.
- THAYER, A. H. and GERALD, Dublin, N. H.: Mouse (*Mus musculus*) from Sorrento, Italy. 38160.
- THOMAS, Miss B. T., Fort Defiance, Ariz. (post-office, Gallup, N. Mex.) Lizard. 38166.
- THOMAS, J. E., Atlanta, Tex.: Rabbit scalp with horn. 37262.
- THOMAS, OLDFIELD, British Museum (Natural History), London, England: Nine bats from Europe and South America. 37523.
- THOMPSON, C. H., Baker City, Oreg.: Obsidian coated with an oxide of aluminum. 37170.
- THOMPSON, C. W., Tacoma, Wash.: Ore from Carbon River mining district, Washington. 37637.
- THOMPSON, ERNEST SETON, New York City: Two specimens of White-tail deer (37417); skulls, head skins, and leg bones of deer (37525). Purchase.
- THOMPSON, J. W., Philadelphia, Pa.: Painted cast of a Japanese giant salamander. Purchase. 37684.
- THORNS, F. R., Ashboro, N. C.: Samples of copper ore from Scarlet mine, near Ashboro. 37023.
- TILDEN, Miss J. E., University of Minnesota, Minneapolis, Minn.: One hundred plants. Purchase. 37819.
- TILLOTSON, LOTTIE S., Seattle, Wash.: Plant. 37701.
- TINGMAN, A. G., Indio, Cal.: Specimens of fossil *Planorbis*. 37921.
- TITUS, Prof. E. S. G., Fort Collins, Colo.: Chalcid parasite on *Carneades tessellata*. (37024); 17 bumble-bees (37859).
- TOLLIN, OSCAR, Sarasota, Fla.: Marine shells from Marco, Fla. 36800.
- TOMPKINS, R. J., Old Point Comfort, Va.: Herring gull. 37734.
- TOURGEE, A. W., U. S. consul, Bordeaux, France: Nest of Chardomeret, from France. 36914.
- TOWER, G. W. (See under Interior Department, U. S. Geological Survey.)
- TOWNE, E. B., West Newton, Mass.: Eleven specimens of California condor skins, 1 egg and a few bones of the same, from California (deposit) (37278); skin of California vulture and 2 colored drawings of the same (deposit) (37429).
- TOWNSEND, Prof. C. H. TYLER, received through Dr. L. O. Howard. Six thousand specimens of Diptera from Mexico. Deposit. 37245.
- TRACY, S. M., Biloxi, Miss.: Received through Department of Agriculture. Plants (36791, 36822, 37072); plants from Mississippi and Louisiana, collected by Messrs. Tracy and Lloyd (37095); 813 plants from the Gulf coast (purchase) (37622).
- TRAPHAGEN, Dr. F. W., Bozeman, Mont.: Two specimens of Bellerophon (*Euphemus* n. sp.) (37192); 2 briquettes of Dakota lignite and pitch (37899).
- TRASK, MRS. BLANCHE, Avalon, Santa Catalina Island, Cal. Received through Department of Agriculture. Fifty-nine plants (36855); 38 plants (37747). Purchase.
- TREGASKIS, J. and M. L., London, England: Dish and patera of Samian ware. Purchase. 37044.
- TROSCHER, A., Chicago, Ill.: Fifty-four specimens of Lepidoptera. Exchange. 37680.
- TUCHEBAND, Dr. A., Maranhao, Brazil: Twenty-five bats from Brazil. Purchase. 37518.

- TUCKER, LEROY, Washington, D. C.: Colt's naval revolver worn by Gen. Frank Tucker, Adjutant-General C. S. A.; also a protector's revolver (purchase) (37332); Allen's patent solid cylinder revolver (gift) (37333).
- TURIN, ITALY, ZOOLOGICAL MUSEUM OF TURIN. Received through Lorenzo Camerano: Three bats. Exchange. 37626.
- TURNER, G. B., U. S. National Museum: Steel-head salmon as accessory to a Kadiak bear group. Purchase. 36960.
- TURNER, H. W. (See under Interior Department, U. S. Geological Survey.)
- TURNER, MRS. HARRIET, Alexandria, Va.: Coiled basket with body of sedge, sewed with strips of hard wood, and a handle of the same material, said to be from Arizona. 37741.
- UDDEN, J. A., Rock Island, Ill.: Atmospheric deposits from various localities. Exchange. 36829.
- UMBACH, L. M., Naperville, Ill.: Two hundred and twenty-five plants, principally from Ontario. Exchange. 37467.
- UMLAUFF, J. F. F., Museum, Hamburg, Germany: Skins and skulls of mammals. (36837, 36838.) Purchase.
- U. S. NATIONAL MUSEUM, ANTHROPOLOGICAL LABORATORIES: Twenty-eight casts of stone implements from Michigan. 37749.
- UNIVERSITY OF UPSALA. (See under Upsala, Sweden.)
- UPSALA, SWEDEN, UNIVERSITY OF UPSALA: Twenty-four birds' skins from Spitzbergen. Exchange. 38174.
- VASEY, MISS FLORA, U. S. National Museum: Stenograph. 37554.
- VAUGHAN, T. WAYLAND, U. S. Geological Survey: Fifteen specimens of coral (*Dichocoeniz stokesi*) from Florida. 37796.
- VELIE, DR. J. W., St. Joseph, Mich.: Three specimens of ophiurans, starfishes, and two photographs of a starfish. 37820.
- VERNON, DR. J. B., Walnut Ridge, Ark.: Mussel shell and four pearls. 37502.
- VERRILL, Prof. A. E., Peabody Museum, Yale University, New Haven, Conn.: Fifty-nine crustaceans from Bermuda (37555); 16 specimens (6 species) of crustaceans from Bermuda and other localities (37665).
- VOIGHT, B. G., Denver, Colo.: Pair of specimens of *Leucosticte australis* from Colorado. 37592.
- VOORHIES, DR. H. G., Mount Vernon, Mo.: Vertebrate fossils. 37721.
- VROMAN, A. C., Pasadena, Cal.: Pack of Indian playing-cards. 37027.
- WADDINGTON, A. H., Parkersburg, Oreg.: Plant. 36872.
- WADLEIGH, MISS FRANCES, Washington, D. C.: Two dried sponges from Swampscott, Mass. 37486.
- WADMOND, S. C., Racine, Wis.: Forty specimens of violets from Wisconsin. Exchange. 37383.
- WADSWORTH, MISS MATTIE, Hallowell, Me.: Thirty-eight dragonflies, representing 9 species. Exchange. 37233.
- WALCOTT, C. D., Hon. (See under Interior Department, U. S. Geological Survey.)
- WALCOTT, C. D., Jr., Washington, D. C.: Three salamanders from Wisconsin. 37083.
- WALKER, BRYANT, Detroit, Mich.: Fresh-water mussel (36979); three shells of *Lampsilis ellipsiformis* from Michigan (37785); fresh-water shells from Florida and Michigan (37906).
- WALKER, HENRY P., Washington D. C.: Three specimens of ferns from New Hampshire. 37869.
- WALKER, DR. J. W., Pine Ridge Agency, S. Dak.: Minerals, vertebrate fossils, and invertebrate fossils. 37283.
- WALL, A. R., Taal, Province of Batangas, Luzon, Philippine Islands: Rhinoceros beetle (*Trichognathus melon* Olivier). 37457.
- WALLER, S. L., San Francisco, Cal.: Six relics from the Philippine Islands. 37212.
- WALLIHAN, A. G., Lay, Colo.: Ten photographs of mammals. 37087.

- WALLINGSFORD, W. W., U. S. National Museum: Copy of "Gilham's Manual for Volunteers and Militia, 1861," found in a Confederate fort at Hilton Head, South Carolina, during the Civil War. 37961.
- WANNER, Prof. A., York, Pa.: Thirty-one specimens of fossil plants from the Triassic of York County. Exchange. 37683.
- WAR DEPARTMENT: Received through Gen. John M. Wilson, Chief of Engineers, U. S. Army: Collection of geological and mineralogical specimens and fossil fishes, incident to the geological surveys west of the 100th meridian (37169). Received through Army Medical Museum, Surgeon-General's Office, Col. Alfred A. Woodhull, in charge, 3 mummies from Peru, obtained by George Kiefer in 1886, 1888, and 1899 (37371). Received through Capt. William S. McCaskey, Fort Santiago, Manila, Philippine Islands, section of Spanish flagstaff from the walls of the arsenal at Fort Santiago (37847). Deposit. Received through Department of Agriculture: One hundred and fifteen plants collected by Capt. L. S. Kelly in the Philippines (38061). (See under de Mey, Dr. C. F., U. S. Army.)
- WARD, H. A., Rochester, N. Y.: Meteorite, from Misshof, Russia (exchange) (37783); meteorite from Bjurbole, southern coast of Finland (exchange) (37815); two large fan corals (purchase) (37808); three meteorites (exchange) (38159).
- WARD, Prof. LESTER F., U. S. Geological Survey: Two hundred and fifty plants from Arizona. 38130.
- WARD, ROWLAND, LIMITED, London, England: Specimen of Tahr, *Hemitragus jerdoni*. Purchase. 38107.
- WARD'S NATURAL SCIENCE ESTABLISHMENT, Rochester, N. Y.: Dried and alcoholic crustaceans (36482); large group of calcite crystals (37079); doubly terminate crystal of calcite (37080); cast of Snapping turtle and a cast of Baur's turtle (37325); concretionary clay from Weymouth, England, concretionary granite from Korsfors, Sweden, concretionary clay iron stone from New York, fulgurite from Starcynow, Poland, volcanic bomb from Mount Etna, and pisolitic limestone from Fern Island, New Zealand, (37636); specimen of *Rhea americana* (37733). Purchase.
- WASHBURNE, CHESTER, Beaver Creek, Oreg.: Received through U. S. Geological Survey: Seventy-five specimens (23 species) of cretaceous mollusks from from the Chicó formation, Crook County, Oreg. 37558.
- WASHINGTON, C. S., U. S. National Museum: Two specimens of tortoise (*Cistudo carolina*) from Washington, D. C., and Maryland (36866, 37071).
- WEED, A. C., Ithaca, N. Y.: Alcoholic specimens of *Ancylus tardus* Say, from a creek near New Hartford, N. Y. 37892.
- WEED, W. H. (See under Interior Department, U. S. Geological Survey.)
- WEEKS, Miss A. D. (See under Agriculture, Department of.)
- WEEKS, F. E. (See under Interior Department, U. S. Geological Survey.)
- WEEMS, J. B. (no address given): Badge of the Maryland Cadets, 1887. 37694.
- WELLER, Prof. STUART, University of Chicago, Chicago, Ill.: Three specimens of *Orthis missouriensis*. 37833.
- WELLS, A. C., Short Hills, N. J. Received through Department of Agriculture: Eight plants from New Jersey. 37126.
- WELSBACH COMPANY, Philadelphia, Pa. Received through W. E. Barrows, president: Six platinum nuggets from Trinity County, Cal. 37568.
- WENZEL, H. W., Philadelphia, Pa.: Ten specimens of parasitic Hymenoptera. 37400.
- WESTERN HIGH SCHOOL, Washington, D. C. Received through E. L. Morris: Two plants from Maryland. Exchange. 38069.
- WHEELER, Dr. Q. M., University of Texas, Austin, Tex.: Collection of ants and two parasites, representing new genera. 37347.

- WHITE, Dr. C. A., Washington, D. C.: Weaver's glass brought from England in 1827 by James Pilkington, of Dighton, Mass. (36863); specimens of an old form of pin used in mounting insects (37447).
- WHITE, DAVID, U. S. Geological Survey: Five specimens of *Camptosorus rhizophyllus* from Pennsylvania. 36928.
- WHITE DENTAL MANUFACTURING COMPANY, Philadelphia, Pa. Received through H. M. Lewis: Nugget of native platinum. Purchase. 37640.
- WHITE, Miss JOSIE, Redding, Cal.: Sphinx moth, *Protoparce cingulata* Fabr. and a specimen of *Catocala* sp. 37069.
- WHITED, KIRK, Ellensburg, Wash. Received through Department of Agriculture: Forty-nine plants from Washington (exchange) (37309); 110 plants from Washington (exchange) (36756); 6 plants from Washington (gift) (37498).
- WHITESELL, O. C., Streator, Ill.: Part of a human skull. 37252.
- WHITHEAD, CALEB, Washington, D. C.: Sample of beach gold from Cape Nome, Alaska. Purchase. 37519.
- WHITING, Dr. C. A., Pacific School of Osteopathy, Los Angeles, Cal.: Holothurians, ascidians, barnacles, and crustaceans. (37655, 37656.)
- WILBUR, Mrs. C. D., Newark, N. J.: Receipt of payment on account of bond for lands, dated December 23, 1799, and signed by William Henry Harrison. 37145.
- WILCOX, T. E. (See under Agriculture, Department of.)
- WILEMAN, A. E., British consulate, Kobe, Japan: One hundred living cocoons of *Monema flavescens*, and 100 moths representing various species. 37760.
- WILKIE, J. E., Chief of Secret Service Bureau, Treasury Department: Specimen of the work of termites in a package of paper blanks. 37982.
- WILKINSON, E. H. Received through Department of Agriculture: Twenty plants from Texas. 36993.
- WILLARD, Mrs. L. G., Sanibel, Fla.: Three species of marine shells. 37608.
- WILLEY, HENRY, New Bedford, Mass.: Ten thousand plants, including lichens, from various localities. Purchase. 36901.
- WILLIAMS, H. E., Sarepta, Miss.: Lucanid beetle, *Lucanus claphus* Fabr. 37840.
- WILLIAMS, Dr. J. J. G., Germantown, Pa.: Six specimens of *Tremex columba* Linnaeus, and two parasites representing the species *Thalessa lunator* Fabr. 36802.
- WILLIAMS, T. A., Takoma Park, D. C.: Lichen from Oregon. 37435.
- WILLIAMS, Mr. (See under New York Botanical Garden.)
- WILLIAMSBURGH SCIENTIFIC SOCIETY, Brooklyn, N. Y. Received through Louis Kirsch: Five specimens of cut and polished white topaz. Exchange. 38109.
- WILLIAMSON, E. B., Vanderbilt University, Nashville, Tenn.: Fifteen specimens (5 species) of dragonflies (exchange) (37118); 6 male specimens of *Calopteryx angustipennis* (exchange) (37715); 6 living and 3 dead crayfishes, from Tennessee (gift) (37864); 11 crayfishes (gift) (37877); 2 crayfishes (*Cambarus rusticus*), from Richland Creek, Nashville, Tenn. (gift) (38045).
- WILLIS, Mrs. I. G., Front Royal, Va. Twelve plants. 36970.
- WILLIS, Mrs. N. P., Washington, D. C.: One hundred plants from Switzerland. 37601.
- WILLISTON, S. W. (See under Kansas, University of.)
- WILSON, Dr. H. V., Biological Laboratory, Beaufort, N. C.: Specimen of *Alpheus* with parasitic isopod. 37037.
- WILSON, J. D., Syracuse, N. Y. Three specimens of *Goniatites ramuveni* from Manlius, N. Y. Purchase. 37008.
- WILSON, Brig. Gen. JOHN M. (See under War Department.)

- WILSON, Miss THOMASANA W., Washington, D. C.: Grooved stone ax from Montgomery County, Md. 36765.
- WINNSBORO GRANITE COMPANY, Charleston, S. C.: Specimen of granite from Rion, S. C. 36999.
- WOHLGEMUTH, CARL, Bozen, Tyrol, Austria: Complete costume of a Tyrolean peasant, with watch and other articles. Exchange. 38134.
- WOLTZ, GEORGE, U. S. National Museum: Two sergeant's chevrons, U. S. Infantry; two service straps, U. S. Artillery; and two enlistment stripes, U. S. Infantry (38010); five bound volumes of Army tactics (38136).
- WOMAN'S COLLEGE OF BALTIMORE, Baltimore, Md.: Received through Arthur Bibbins, director. Collection of rocks. Exchange. 37466.
- WOOD, LEVI, Church, Mich.: Mastodon bones from Church, collected by Alban Stewart. Purchase. 38114.
- WOOD, Dr. T. D. (See under Jenkins, Dr. O. P.)
- WOOD, Maj. W. W., U. S. A., Jefferson Barracks, Mo.: Luna moth, *Actias luna* Linnaeus. 36862.
- WOODBURY, Mrs. FRANK M., Pelham, N. H.: Rose galls, *Rhodites bicolor* Harr. 38147.
- WOODDELL, G. P., Seven Oaks, Fla.: Received through Department of Agriculture. Plant from Florida. 37124.
- WOODHULL, Col. A. A. (See under War Department.)
- WOOLMAN, Mrs. M. S., New York City: Loom used in the schools of New York City. 37542.
- WOOSTER, L. C., State Normal School, Emporia, Kans.: Two goniatites from the Upper Coal Measures. 37227.
- WOOTON, E. O., Mesilla Park, N. Mex.: Received through Department of Agriculture. Plant from New Mexico. 37598.
- WORTHEN, C. K., Warsaw, Ill.: Five birds' skins from Galapagos Islands (purchase) (36709); 110 mammal skins and skulls from British America (gift) (36835); tortoise egg from South Albatraz Island, Galapagos group (purchase) (36743); 5 birds' skins from the Galapagos Islands (purchase) (36709); Whooping crane (purchase) (37587); 3 birds' skins and a Stormy petrel (purchase) (37628).
- WRIGHT, B. H., Penn Yan, N. Y.: Three specimens of unios from Florida. 37294.
- WRIGHT, E. M., Eureka, Ills.: Five specimens, 3 species, of marine shells from California. 37378.
- YALE, CHARLES, Louisiana, Mo.: Nine specimens of Carboniferous crinoids (exchange) (37449); 3 specimens of Burlington group blastoids, 5 specimens of Burlington group crinoids (37631); 11 specimens of sub-carboniferous crinoids, blastoids, and corals (37842).
- YOUNG, B. H., Louisville, Ky.: Mounted skin of a tarpon. 37086.
- YOUNG BROTHERS, Cartersville, Ga.: Mole-cricket, *Gryllotalpa borealis*. 36957.
- YOUNG, C. M., Crow Agency, Mont.: Timber wolf from Montana. Purchase. 37757.
- YOUNG, R. T., Boulder, Colo.: Mammals and birds from Texas and Colorado. Deposit. 36926.
- YOUNG, R. T., Waring, Tex.: Two batrachians from Colorado. 37038.
- YOUNGLOVE, Dr. J. E., Bowling Green, Ky.: Nineteen specimens of Pentremites. 37028.
- ZERFASS, J. J. R., Ephrata, Pa.: "Christopher Sauer" Bible. Purchase. 37146.
- ZOLLIKOFER, E. H., St. Gallen, Switzerland: Ninety-one small mammals from Switzerland, Italy, and Sicily (37532); mammals from Switzerland (38013). Purchase.

APPENDIX III.

DISTRIBUTION OF SPECIMENS.

AMERICA.

NORTH AMERICA.

CANADA.

Ontario.

Billings, Walter R., Ottawa: Fossil crinoids (32 specimens); fossils (53 specimens). Exchange. (D. 13874, 13986.)

Fowler, James, Kingston: Violets (10 specimens). Exchange. (D. 14034.)

Geological Survey of Canada, Ottawa: Fossils (10 specimens); plants (3 specimens). Exchange. (D. 14144, 14265.)

Macoun, J. M., Ottawa: Violets (10 specimens). Exchange. (D. 14030.)

Saunders, N. E., London: Plants (6 specimens). Exchange. (D. 13985.)

MEXICO.

Mexico.

National Medical Institute, Mexico: Plants (708 specimens). Gift. (D. 14737.)

National Museum, Mexico: Plants (3 specimens); geological material (6 specimens). Exchange. (D. 14730, 14113.)

UNITED STATES.

Alabama.

Earle, F. S., Auburn: Violets (10 specimens). Exchange. (D. 14006.)

Arkansas.

Fort Smith: Public School, Marine invertebrates (288 specimens, Series VI, set 100). Gift. (D. 14275.)

California.

Anderson, F. M., Berkeley: Fossils (14 specimens). Exchange. (D. 14236.)

Brandege, T. S., San Diego: Plants (4 specimens). Lent for study. (D. 14321.)

California—Continued.

California Academy of Sciences, San Francisco: Plants (3 specimens). Exchange. (D. 14266.)

Chandler, Harley P., Berkeley: Plants (49 specimens). Lent for study. (D. 14390.)

Eastwood, Alice, San Francisco: Violets (10 specimens). Exchange. (D. 14011.)

Grinnell, Joseph, Palo Alto: Pigmy Owl (23 skins). Lent for study. (D. 13992.)

Kimball, Laura F., National City: Plants (21 specimens). Exchange. (D. 13745.)

Lewis, J. B., Petaluma: Stone implements (8 specimens). Exchange. (D. 13739.)

Loomis, L. M., San Francisco: Birds' skins (6 specimens). Exchange. (D. 13906.)

Northrup, C. H., San Jose: Shells (3 specimens). For study. (D. 13868.)

Smith, James Perrin, Stanford University: Fossil ammonoids (19 specimens); Mesozoic fossils (77 specimens). Lent for study. (D. 13905, 14003.)

Colorado.

Ball, E. D., Fort Collins: Insects (283 specimens). Lent for study. (D. 13898.)

Bethel, E. C., Denver: Violets (10 specimens). Exchange. (D. 14014.)

Osterhout, G. E., New Windsor: Violets (10 specimens). (D. 14033.)

Titus, E. S. G., Fort Collins: Bees (332 specimens). Lent for study. (D. 13894.)

Connecticut.

Coe, Wesley R., New Haven: Nemer-teans (71 specimens). Lent for study. (D. 14445.)

Connecticut—Continued.

- Eames, E. H., Bridgeport: Violets (10 specimens). Exchange. (D. 14036.)
 Edwards, Charles L., Hartford: Holothurians (39 specimens). Lent for study. (D. 14044.)
 Evans, A. W., New Haven: Plants (66 specimens); plants (7 specimens). Lent for study. (D. 14186, 14685.)
 Koons, B. F., Storrs: One snake. Exchange. (D. 14083.)
 Peabody Museum, New Haven: Violets (10 specimens); marine invertebrate (1 specimen). Exchange. (D. 14140, 14380.)
 Pirsson, L. V., New Haven: Geological material (15 specimens). Exchange. (D. 14686.)
 Robinson, H. H., New Haven: Rocks (7 specimens). Lent for study. (D. 14574.)
 Verrill, A. E., New Haven: Crustaceans (12 specimens). Exchange. (D. 14299.)

Delaware.

- Canby, W. M., Wilmington: Plants (16 specimens); violets (10 specimens); plants (9 specimens). Exchange. (D. 13773, 14009, 14702.)

District of Columbia.

- Beckwith, Paul, Washington: Mauser rifle. Exchange. (D. 14185.)
 Benjamin, Mrs. C. G., Washington: Moki peach basket. Exchange. (D. 14118.)
 Columbian University, Washington: Fossils (375 specimens). Lent for study. (D. 14117.)
 Crosby, O. T., Washington: Cinctures (2 specimens). Lent for study. (D. 14313.)
 Department of Agriculture, Washington: Minerals (222 specimens) (D. 14631).
 Greene, E. L., Washington: Violets (10 specimens). Exchange. (D. 14031.)
 Hayford, Mark C., Washington: Geological material (22 specimens); botanical material (6 specimens). Exchange. (D. 13828, 13848.)

District of Columbia—Continued.

- Heitmuller, A., Washington: Ethnological material (167 specimens); Pueblo pottery (55 specimens). Exchange. (D. 13952, 14129.)
 Holnr, Theodor, Brookland: Plants (15 specimens). Lent for study. (D. 14425.)
 Howell, E. E., Washington: Marble (3 slabs). Exchange. (D. 13925.)
 Knowlton, F. H., Washington: Ferns (3 specimens). Exchange. (D. 14344.)
 Morris, E. L., Washington: Violets (10 specimens). Exchange. (D. 14024.)
 Nelson, Elias, Washington: Plants (47 specimens). Exchange. (D. 14470.)
 Peters, A. J., Washington: Violets (10 specimens). Exchange. (D. 14037.)
 Ridgway, R., Brookland: Birds' skins (34 specimens). Lent for study. (D. 13858.)
 Topping, D. L., Washington: Ferns (3 specimens); plants (20 specimens). Exchange. (D. 14352, 14465.)
 U. S. Fish Commission: Fur-seal skins (3 specimens). Economic crustaceans (49 specimens). Ethnological material. Lent for study. Crustaceans (48 specimens). Lent for study. Shells (67 specimens). Lent for study. Rigged-boat models (7 specimens); collection of fishery apparatus. Shrimp. (D. 13964, 14088, 14090, 14315, 14334, 14394, 14395, 14632.)
 U. S. Geological Survey: Minerals (16 specimens). (D. 14689.)
 Yaste, W. J., Washington: Pueblo (3 specimens.) Exchange. (D. 14739.)

Georgia.

- Wesleyan Female College, Macon: Geological material (43 specimens). Gift. (D. 14423.)

Idaho.

- University of Idaho, Moscow: Geological material (28 specimens and 18 thin sections). Gift. (D. 14415.)

Illinois.

- Chicago, University of Chicago: Fossils (10 specimens). Exchange. (D. 14141.)

Illinois—Continued.

Elliot, D. G., Chicago: American mammals (14 skulls); alcoholic bats (4 specimens). Lent for study. (D. 14641, 14760.)

Enteman, M. M., Chicago: Insects (392 specimens). Lent for study. (D. 14270.)

Field Columbian Museum, Chicago: Indian shields (8 specimens). Exchange. (D. 14525.)

Forbes, S. A., Urbana: Orang-outang (skull). Lent for study. (D. 13919.)

Meek, S. E., Chicago: Shark (jaw) and fish (teeth). Lent for study. (D. 14420.)

Millspaugh, C. F., Chicago: Violets (10 specimens). Exchange. (D. 14025.)

St. Francis Academy, Joliet: Casts of prehistoric stone implements (95 specimens, set 77). Gift. (D. 14095.)

Tarbell, F. G., Chicago: Etruscan pottery (4 specimens). Lent for study. (D. 14066.)

Troschel, A., Chicago: Lepidoptera (54 specimens). Exchange. (D. 14419.)

Umbach, L. M., Naperville: Violets (10 specimens). Exchange. (D. 14026.)

Indiana.

Blatchley, W. S., Indianapolis: Salamanders (3 specimens). Lent for study. (D. 14619.)

Eigenmann, C. G., Bloomington: Salamander. Lent for study. (D. 14154.)

Evermann, B. W., Culver: Plants (105 specimens). Lent for study. (D. 13804.)

Scheib, K., Lawrenceburg: Indian relics (14 specimens). Exchange. (D. 14075.)

Workingman's Institute and Public Library, New Harmony: Casts of prehistoric stone implements (set 79); invertebrates (24 specimens). Gift. (D. 14296.)

Iowa

Fink, B., Fayette: Plants (9 specimens). Exchange. (D. 14684.)

Historical Department of Iowa, Des Moines. Archaeological material (54 specimens). Gift. (D. 13812.)

Iowa—Continued.

Iowa City: University of Iowa. Hydrroids. Gift. (D. 14642.)

Jewell Lutheran College, Jewell: Marine invertebrates (291 specimens, Series VI, set 99). Gift. (D. 14148.)

Sharpe, R. W., Dubuque: Ostracoda (500 specimens). Lent for study. (D. 13791.)

Kansas.

Hitchcock, A. S., Manhattan: Violets (10 specimens). Exchange. (D. 14023.)

Lawrence: University of Kansas. Fossil plants (128 specimens). Exchange. (D. 13818.)

Kentucky.

Garman, H., Lexington: Marine invertebrates (20 specimens). Lent for study. (D. 14501.)

Price, Sadie F., Bowling Green: Ferns (3 specimens). Exchange. (D. 14353.)

Louisiana.

Louisiana Industrial Institute, Ruston: Geological material (32 specimens); invertebrates (26 specimens). Gift. (D. 14479.)

Monroe, City School: Geological material (31 specimens); invertebrates (28 specimens). Gift. (D. 14487.)

Maine.

Norton, Arthur H., Westbrook: Birds' skins (18 specimens). Lent for study. (D. 13847.)

Wadsworth, Mattie, Hallowell: Odonata (32 specimens). Exchange. (D. 13979.)

Maryland.

Bantz, G. E., Baltimore: Sponges (15 specimens). For study. (D. 14259.)

Smith, John Donnell, Baltimore: Plants (90 specimens). Exchange. (D. 14158.)

Woman's College, Baltimore: Collection of Foraminifera and Pteropod ooze. Gift. (D. 14131.)

Massachusetts.

Amherst College, Amherst: Collection of Foraminifera. Gift. (D. 14547.)

Bangs, Outram, Boston. Birds' skins (16 specimens). Lent for study. (D. 14731, 14181.)

Massachusetts—Continued.

- Brewster, William, Cambridge: Birds' skins (2 specimens). Lent for study. (D. 14475.)
- Clarke, S. F., Williamstown: Marine invertebrates (2 specimens). Lent for study. (D. 13938.)
- Crosby, W. O., Boston: Green Porphyry (1 specimen). Exchange. (D. 14719.)
- Cummings, Clara, Wellesley: Plants (10 specimens). Exchange. (D. 14373.)
- Davenport, G. E., Medford: Ferns (12 specimens). Lent for study. Plants (14 specimens). Exchange. Plants (2 specimens). Lent for study. Plants (51 specimens). Lent for study. Plants (3 specimens). Lent for study. Plants (2 specimens). Exchange. Plants (13 specimens). Lent for study. (D. 13767, 13817, 13980, 14110, 14138, 14481.)
- Deane, Walter, Boston: Violets (10 specimens). Exchange. Plant (1 specimen). Lent for study. (D. 14010, 14292.)
- Dodge, Raynal, Newburyport: Plants (4 specimens). Exchange. (D. 13967.)
- Eigenmann, C. H., Woods Hole: Fishes (24 specimens). Lent for study. (D. 13866.)
- Fernald, M. L., Boston: Violets (10 specimens). Exchange. Plants (155 specimens). Lent for study. (D. 14336.)
- Garman, S., Cambridge: Fishes (2 specimens). Lent for study. (D. 14663.)
- Gray Herbarium, Boston: Plants (81 specimens). Lent for study. Violets (10 specimens). Exchange. Plants (70 specimens). Exchange. Plants (47 specimens). Lent for study. Plants (3 specimens). Exchange. Plants (152 specimens). Exchange. Plants (319 specimens). Exchange. (D. 13799, 14012, 14183, 14184, 14263, 14593, 14714.)
- Holmes, S. J., Woods Hole: Amphipods. Lent for study. (D. 13845.)

Massachusetts—Continued.

- Howe, Reginald Heber, jr., Brookline: Birds' skins (68 specimens). Lent for study. (D. 14145.)
- Hyatt, Alpheus, Boston: Shells. Lent for study. (D. 13780.)
- Morse, E. S., Salem: Cambrian brachiopods (20 specimens). For study. (D. 14544.)
- Museum of Comparative Zoology, Cambridge: Fossils (10 specimens); Ophiurans (212 specimens). Exchange. (D. 14142, 14383.)
- Roberts, E. W., Chelsea: Indian baskets (9 specimens). Exchange. (D. 14515.)
- Robinson, B. L., Boston: Plants (4 specimens). Lent for study. (D. 14630.)
- Slosson, Margaret, Andover: Plants (2 specimens). Exchange. (D. 14139.)
- True, R. H., Cambridge: Plants (60 specimens). Lent for study. (D. 14529.)
- Wilson, Charles B., Westfield: Parasitic Copepods (2,900 specimens). Lent for study. (D. 14568.)
- Woodworth, W. McM., Cambridge: Geological material (28 specimens and 4 thin sections). Lent for study. (D. 14045.)

Michigan.

- Clark, H. L., Olivet: One bird in alcohol. Lent for study. (D. 13974.)
- Cole, Leon J., Ann Arbor: Marine invertebrates (3 specimens). Lent for study. (D. 14000.)

Minnesota.

- McMillan, Conway, Minneapolis: Violets (10 specimens). Exchange. (D. 14021.)
- Minneapolis, University of Minnesota: Plants (3 specimens). Exchange. (D. 14264.)
- Tilden, Josephine E., Minneapolis: Plant. Lent for study. (D. 14124.)

Missouri.

- Glatfelter, M. M., St. Louis: Violets (10 specimens). Exchange. (D. 14008.)
- Missouri Botanical Gardens, St. Louis: Violets (10 specimens). Exchange.

Missouri—Continued.

Living plants (2 specimens). Exchange. Plants (3 specimens). Gift. (D. 14016, 14058, 14262.)

Trelease, William, St. Louis: Plants (58 specimens). Lent for study. (D. 13900, 14472.)

Yale, Charles, Louisiana: Fossils (13 specimens). Exchange. (D. 14204.)

Nebraska.

Williams, A. L., Omaha: Foraminifera. For study. (D. 14169.)

New Hampshire.

Eaton, A. A., Seabrook: Plants (5 specimens). Lent for study. Violets (10 specimens). Exchange. Plants (44 specimens). Lent for study. Plants (10 specimens). Lent for study. (D. 13895, 14015, 14128, 14322.)

New Jersey.

Best, G. N., Rosemont: Plants (28 specimens). Lent for study. (D. 13957.)

Brown, Mrs. John Crosby, Orange: Musical instruments (2 specimens). Exchange. (D. 14749.)

Emmons, G. T., Princeton: Indian basket and bone carving. Exchange. (D. 14536.)

Trenton: High School, Casts of prehistoric stone implements (80 specimens, set 86). Gift. (D. 14487.)

Washington, H. S., Locust: Minerals (2 specimens). Exchange. (D. 14655.)

New Mexico.

Birtwell, F. J., Albuquerque: Birds' skins (60 specimens); birds' skins (50 specimens); birds' skins (75 specimens). Lent for study. (D. 14280, 14301, 14348.)

Springer, Frank, East Las Vegas: Dried specimen of *Pentacrinus*. Exchange. (D. 14449.)

New York.

Allen, J. A., New York: Birds' skins (2 specimens); plants (43 specimens); 16 skins of opossum and 19 skulls. Lent for study. (D. 13761, 13763, 14546.)

American Museum of Natural History, New York: Seven plaster casts of stone and whalebone clubs. Exchange.

New York—Continued.

Fossils (10 specimens). Exchange.

Eskimo clothing, etc. Exchange.

Fossil medusæ (31 specimens). Gift. (D. 13861, 14146, 14346, 14534.)

Bicknell, E. P., Riverdale-on-Hudson: Violets (10 specimens). Exchange.

(D. 14017.)

Boas, Franz, New York: Copper images. Lent for study. (D. 14471.)

Britton, Dr. N. L., New York: Violets (10 specimens). Exchange. Plant. Lent for study. (D. 14039, 14418.)

Britton, Mrs. N. L., New York: Plants (29 specimens). Lent for study. Plants (65 specimens). Lent for study. Plants (14 specimens). Exchange. Plants (85 specimens). Exchange. Plants (35 specimens). Exchange. Plants (7 specimens). Lent for study. Plants (27 specimens). Exchange. Plants (9 specimens). Lent for study. (D. 14194, 14114, 14215, 14278, 14350, 14550, 14708, 14709.)

Brooklyn: Institute of Arts and Sciences, Pueblo pottery (55 specimens). Exchange. (D. 14693.)

Brooklyn: Public School No. 15, Casts of prehistoric stone implements (83 specimens, set 82). Gift. (D. 44422.)

Buffalo: Historical Society, Casts of prehistoric stone implements (97 specimens, set 75). Gift. (D. 13774.)

Burnham, S. H., Vaughns: Violets (10 specimens). Exchange. (D. 14022.)

Bussing, D. S., Minaville: Stone implements (58 specimens). Exchange. (D. 14571.)

Chapman, Frank M., New York: *Captomys* (28 specimens). Lent for study. (D. 14320.)

Clarke, John M., Albany: Fossils (559 specimens); fossil (1 specimen); fossils (54 specimens). Lent for study. (D. 14001, 14237, 14620.)

Clute, W. M., Binghamton: Plants (3 specimens). Exchange. (D. 14279.)

Cochrane, A. V. S., Hudson: (Geological material (22 specimens). For examination. (D. 14404.)

New York—Continued.

Columbia University, New York:
Plants (3 specimens). Exchange.
(D. 14261.)

Cowell, J. F., Buffalo: Violets (10 specimens). Exchange. (D. 14027.)

Dwight, Jonathan, jr., New York:
Birds' skins (28 specimens). Lent
for study. (D. 14507.)

Gilbert, B. D., Clayville: Plants (3 specimens). Lent for study. (D. 14551.)

Grammar School No. 2, Brooklyn:
Casts of prehistoric stone implements
(97 specimens, set 74). Gift. (D. 13747.)

Grout, H. J., Brooklyn: Plants (12 specimens). Exchange. (D. 13877.)

Haberer, J. V., Utica: Plants (77 specimens). Lent for study. (D. 14543.)

Hay, O. P., New York: Fossils (2 specimens and fragments). Lent for study. (D. 14454.)

House, H. D., Syracuse: Plants (41 specimens). Exchange. (D. 14054.)

New York Botanical Garden, Bronx Park, New York: Plants (3 specimens). Lent for study. Plants (120 specimens). Lent for study. (Plant (1 specimen). Exchange. Plants (2 specimens). Lent for study. Plants (315 specimens). Exchange. (D. 13941, 14056, 14182, 14248, 14748.)

New York State Museum, Albany: Fossils (10 specimens). Exchange. (D. 14147.)

Robinson, Wirt, West Point: Mouse (skin and skull). Exchange. (D. 14530.)

Rowlee, W. W., Ithaca: Violets (10 specimens). Exchange. (D. 14032.)

Rydberg, P. A., Bronx Park, New York: Plants (206 specimens); plants (70 specimens); plants (123 specimens). Lent for study. (D. 14073, 14094, 14195.)

Smith, Mrs. Hugh M., Brooklyn: Plants (32 specimens). Exchange. (D. 14362.)

Underwood, L. M., New York: Plants (5 specimens). Lent for study. (D. 14458.)

New York—Continued.

Union College, Schenectady: Isopods (10 specimens). Exchange. (D. 14323.)

North Carolina.

Beadle, C. D., Biltmore: Violets (10 specimens). Exchange. Plants (50 specimens). Lent for study. (D. 14013, 14165.)

Biltmore Herbarium, Biltmore: Ferns (3 specimens). Exchange. (D. 14351.)

Mohr, Charles, Asheville: Plants (5 specimens). Lent for study. (D. 13875.)

Ohio.

Comstock, F. W., Cleveland: Violets (10 specimens). Exchange. (D. 14035.)

Dayton: Public Library and Museum, Corals and sponges (55 specimens). Gift. (D. 14041.)

Hine, James S., Columbus: Shells (2 specimens). Lent for study. (D. 14162.)

Pennsylvania.

Academy of Natural Sciences, Philadelphia: Alcoholic bats (2 specimens); plants (3 specimens). Exchange. (D. 14120, 14260.)

Barbour, W. C., Sayre: Plants (31 specimens). Exchange. (D. 14224.)

Carnegie Museum, Pittsburg: Model of Red River cart and model of Chinese wheelbarrow. Lent for study. Model of Egyptian chariot and model of Persian farm cart. Lent for study. Rattlesnakes (2 specimens); marine invertebrates (310 specimens); fossils (10 specimens). Exchange. (D. 13764, 13888, 13932, 14092, 14143.)

Crawford, Joseph, Philadelphia: Violets (10 specimens); ferns (3 specimens). Exchange. (D. 14007, 14354.)

Culin, Stewart, Philadelphia: Indian games (16). Lent for study. (D. 14557.)

Dixon, Samuel G., Philadelphia: Terracotta spindle-whorls (37 specimens). Lent for study. (D. 14598.)

Free Museum of Science and Art, Philadelphia: Ethnological material (158 specimens); game of Mancala. Lent for study. (D. 13907, 13921.)

Pennsylvania—Continued.

Heller, A. A., Lancaster: Plants (25 specimens). Lent for study. Plants (69 specimens). Lent for study. Violets (10 specimens). Exchange. (D. 13769, 13996, 14341.)

Paxson, H. D., Bycot Station: Ethnological and archaeological material (317 specimens); casts of prehistoric stone implements (95 specimens, set 80). Exchange. (D. 14341.)

Philadelphia: Commercial Museum, Violets (10 specimens). Exchange. (D. 14028.)

Rehn, J. A. G., Philadelphia: Bats (3 specimens); bats (35 specimens). Lent for study. (D. 14384, 14605.)

Strecker, Hermann, Reading: Lepidoptera (9 specimens). Lent for study. Lepidoptera (3 specimens). Exchange. (D. 13768.)

Rhode Island.

Collins, Franklin, Providence: Violets (10 specimens). Exchange. (D. 14018.)

Critchley, W. F., Providence: Two skulls of fur seals. Lent for study. (D. 14115.)

Museum of Natural History, Providence: White-footed mice (3 specimens). Gift. (D. 14081.)

Parsons, F. R., Providence: Birds' eggs (19 specimens). Exchange. (D. 14337.)

Tennessee.

Martin College for Young Ladies, Pultaski: Casts of prehistoric stone implements (97 specimens, set 76). Gift. (D. 13975.)

Williamson, E. D., Nashville: Dragon flies (14 specimens). Exchange. Insects (9 specimens). Lent for study. Dragon flies (199 specimens.) Lent for study. Dragon flies (24 specimens.) Exchange. Dragon fly. Exchange. (D. 13947, 14116, 14281, 14294, 14379.)

Texas.

Singley, J. A., Giddings: Eocene corals (55 specimens). Exchange. (D. 13826.)

Utah.

Jones, Marcus E., Salt Lake City: Violets (10 specimens). Exchange. (D. 14020.)

Washington.

Flett, J. B., Tacoma: Plants (25 specimens). Exchange. (D. 14232.)

Piper, C. V., Pullman: Plants (22 specimens). Exchange. (D. 13913.)

Wisconsin.

Black River Falls: High school, Casts of prehistoric stone implements (80 specimens, set 87). Gift. (D. 14581.)

Eau Claire: High school, Casts of prehistoric stone implements (81 specimens, set 88). Gift. (D. 14522.)

Elkhorn: High school, Casts of prehistoric stone implements (87 specimens, set 81). Gift. (D. 14333.)

La Crosse: High school, Casts of prehistoric stone implements (81 specimens, set 89). Gift. (D. 14523.)

Omro: High school, Casts of prehistoric stone implements (99 specimens, set 78). Gift. (D. 14256.)

Racine: High school, Casts of prehistoric stone implements (81 specimens, set 90). Gift. (D. 14597.)

Sheboygan: High school, Casts of prehistoric stone implements (84 specimens, set 83); fishes (69 specimens). Gift. (D. 14491.)

Waukesha: High school, Casts of prehistoric stone implements (80 specimens, set 84); fishes (66 specimens, set 115). Gift. (D. 14492.)

West Bend: High school, Casts of prehistoric stone implements (80 specimens, set 85); fishes (68 specimens, set 113). Gift. (D. 14493.)

Wyocena: Public schools, Casts of prehistoric stone implements (82 specimens, set 91). Gift. (D. 14720.)

Wadmond, S. C., Racine: Plants (20 specimens). Exchange. (D. 14703.)

Wyoming.

Rocky Mountain Herbarium, Laramie: Plant. For study. (D. 14461.)

WEST INDIES.

Jamaica.

Taylor, C. B., Kingston: Shells (3 specimens). For study. (D. 14405.)

SOUTH AMERICA.

BRAZIL.

- Derby, Orville A., São Paulo: Sandstone.
Lent for study. (D. 13959.)
Museu Paulista, São Paulo: Insects (8
specimens). Exchange. (D. 13805.)

URUGUAY.

- National Museum, Montevideo: Alco-
holic specimens of bats. Gift. (D.
14168.)

ASIA.

INDIA.

- Indian Museum, Calcutta: Ophiurans
(39 specimens). Exchange. (D.
13488.)

EUROPE.

AUSTRIA.

- Berwerth, Fred, Vienna: Meteorite. Ex-
change. (D. 14559.)
Imperial Royal Geological Establish-
ment, Vienna: Fossils (10 speci-
mens). Exchange. (D. 14152.)
Royal Natural History Museum, Vienna:
Ophiurans (42 specimens). Ex-
change. (D. 14387.)

BELGIUM.

- Mahillon, Victor C., Brussels: Model of
musical instrument. Exchange. (D.
14716.)
de Vrière, Baron Raoul, Lophem Zedel-
ghem: Beetles (226 specimens). Ex-
change. (D. 13869.)

DENMARK.

- Bergh, R., Copenhagen, Mollusks (3
specimens). Lent for study. (D.
13793.)
Zoological Museum, Copenhagen: Ophiu-
rans (50 specimens). Exchange.
Echini (5 specimens). Exchange.
Echini (1 specimen). Lent for
study. (D. 14398, 14524.)

FRANCE.

- Gandoger, Michel, Villefranche: Plants
(179 specimens). Exchange. (D.
14715.)
Grès, Louis, Noisy-le-Sec, Seine: Plants
(8 specimens). Lent for study. (D.
13827.)
Museum of Natural History, Paris: Eco-
nomic crustaceans (69 specimens);
fossils (10 specimens); ophiurans (57
specimens). Exchange. (D. 13830,
14161, 14389.)
Sidorot, Professor, Rennes: Plant. For
study. (D. 14309.)

GERMANY.

- Krantz, F., Bonn: Meteorite. Exchange.
(D. 13978.)
Royal Museum of Natural History, Ber-
lin: Diptera (384 specimens). Ex-
change. (D. 14700.)
Schellwien, E., Königsberg: Fossils (516
specimens). Lent for study. (D.
14122.)
Von Zittel, Karl A., Munich: Fossils (10
specimens). Exchange. (D. 14150.)
Zoological Museum, Kiel: Shrimp. Ex-
change. (D. 13762.)

GREAT BRITAIN.

England.

- British Museum (Natural History), Lon-
don: Bats (2 specimens); squirrels
(2 skins and skulls); fossils (10 speci-
mens); ophiurans (71 specimens).
Exchange. Mammals (7 specimens).
Lent for study. Mammals (3 speci-
mens). Exchange. (D. 13902,
13904, 14151, 14386, 14160.)
Drury, Charles T., London: Ferns (10
specimens); plants (5 specimens).
Exchange. (D. 13945, 13981.)
Günther, A., Surrey: Mexican toad.
Lent for study. (D. 14277.)
Hampson, Sir George F., London:
Moths (10 specimens). Lent for
study. (D. 13878.)
Lovett, Edward, Croydon: Archæolog-
ical material (40 specimens). Ex-
change. (D. 14447.)
Lydekker, R., London: Casts of Eskimo
faces (6 specimens); Indian heads (5
specimens). Exchange. (D. 14391.)

England—Continued.

Priest, B. W., Keeppham: Foraminifera (12 specimens). For study. (D. 13862.)

Royal Gardens, Kew: Plants (246 specimens). Exchange. Plants (2 specimens). Lent for study. (D. 14057, 14595, 14654.)

Thomas, Oldfield, London: Squirrel (skin and skull); squirrels (9 specimens); Cuban bats (4 skins and skulls). Lent for study. (D. 13903, 13983, 14667.)

Ireland.

Science and Art Museum, Dublin: Material from flint working sites. Gift. (D. 13936.)

HOLLAND.

van Roon, G., Rotterdam: Beetles (71 specimens). Exchange. (D. 14340.)

Royal Geological Museum, Leiden: Fossils (39 specimens). Exchange. (D. 14276.)

ITALY.

Camerano, Lorenzo, Turin: Bones of a Barren Ground Caribou (3 specimens.) Lent for study. (D. 14583.)

Gestro, R., Genoa: Bats in alcohol (24 specimens). Exchange. (D. 14180.)

Royal Zoological Museum, Turin: Bats in alcohol (3 specimens); marine invertebrates (2 specimens). Exchange. (D. 14364, 14369.)

NORWAY.

Brögger, W. C., Christiania: Rocks (79 specimens). Exchange. (D. 14706.)

SPAIN.

Comabella, I., Barcelona: Coleoptera (12 specimens). Exchange. (D. 14613.)

SWEDEN.

Natural History Museum, Stockholm: Fossils (10 specimens). Exchange. (D. 14149.)

SWITZERLAND.

Narbel, Paul, Lausanne: Mammals (48 skins and skulls). Exchange. (D. 14464.)

OCEANIA.

NEW ZEALAND.

Canterbury Museum, Christchurch: Fossils (44 specimens). Exchange. (D. 14109.)

APPENDIX IV.

BIBLIOGRAPHY.

PUBLICATIONS OF THE MUSEUM.

ANNUAL REPORT.

Annual Report | of the | Board of Regents | of the | Smithsonian Institution, | showing | the operations, expenditures, and condition | of the Institution | for the | year ending June 30, 1897. | — | Report | of the | U. S. National Museum. | Part II. | — | Washington: | Government Printing Office. | 1901.

8 vo., pp. xii, 1-515, 110 pls.

Annual Report | of the | Board of Regents | of the | Smithsonian Institution, | showing | the operations, expenditures, and condition | of the Institution | for the | year ending June 30, 1899. | — | Report | of the | U. S. National Museum. | — | Washington: | Government Printing Office. | 1901.

8vo., pp. xviii, 1-1294, 36 pls., 347 figs.

Annual Report | of the | Board of Regents | of the | Smithsonian Institution, | showing | the operations, expenditures, and condition | of the Institution | for the | year ending June 30, 1899. | — | Report | of the | U. S. National Museum. | — | Washington: | Government Printing Office. | 1901.

8vo., pp. xv, 1-598, 62 pls., 74 figs.

PROCEEDINGS.

Smithsonian Institution. | United States National Museum. | — | Proceedings | of the | United States National Museum. | — | Volume XXII. | — | Published under the direction of the Smithsonian Institution. | — | Washington: | Government Printing Office. | 1900.

8vo., pp. xii, 1-1075, 18 pls., 15 figs.

SPECIAL BULLETIN.

Smithsonian Institution. | United States National Museum. | — | Special Bulletin. | — | American Hydroids. | — | Part I. | The Plumulariæ, | with thirty-four plates, | By | Charles Cleveland Nutting, | Professor of Zoology, University of Iowa. | — | Washington: | Government Printing Office. | 1900.

Special Bulletin U. S. Nat Mus., No. 4.
4to., pp. ii, 1-285, 34 pls., 124 figs.

PAPERS PUBLISHED IN SEPARATE FORM DURING THE YEAR ENDING JUNE 30, 1901.

[From the Report for 1898.]

Report upon the condition and progress of the U. S. National Museum during the year ending June 30, 1898. By Charles D. Walcott. pp. 1-149.

The crocodilians, lizards, and snakes of North America. By Edward Drinker Cope. pp. 153-1270, pls. 1-36, figs. 1-346.

[From the Report for 1899.]

- Report upon the condition and progress of the U. S. National Museum during the year ending June 30, 1899. By Richard Rathbun. pp. 1-152.
- Guide to the study of the collections in the Section of Applied Geology. The Nonmetallic minerals. By George P. Merrill. pp. 155-483, pls. 1-30, figs. 1-11.
- A primitive frame for weaving narrow fabrics. By Otis Tufton Mason. pp. 485-510, pls. 1-9, figs. 1-19.
- An early West Virginia pottery. By Walter Hough. pp. 511-521, pls. 1-18.
- Pointed bark canoes of the Kutenai and Amur. By Otis T. Mason, with notes on the Kutenai canoe by Meriden S. Hill. pp. 523-537, pls. 1-5, figs. 1-6.
- Descriptive catalogue of a collection of objects of Jewish ceremonial deposited in the U. S. National Museum by Hadji Ephraim Benguiat. By Cyrus Adler and I. M. Casanowicz. pp. 539-561, pls. 1-36.

[From Volume 23 of the Proceedings.]

- No. 1203. A hundred new moths of the family Noctuidæ. By John B. Smith. pp. 413-495.
- No. 1204. A new Bird of Paradise. By Rolla P. Currie. pp. 497-499, pl. 17.
- No. 1205. Synopsis of the Naiades, or Pearly Fresh-water Mussels. By Charles Torrey Simpson. pp. 501-1044, pl. 18.
- No. 1206. Classification of the Ichneumon Flies, or the superfamily Ichneumonoidæ. By William H. Ashmead. pp. 1-220.
- No. 1207. A new rhinoceros, *Trigonias osborni*, from the Miocene of Nevada. By Frederic A. Lucas. pp. 221-223, figs. 1, 2.
- No. 1208. New species of moths of the superfamily Tineina from Florida. By August Busck. pp. 225-254, pl. 1.
- No. 1209. Life histories of some North American moths. By Harrison G. Dyar. pp. 255-284.
- No. 1210. Synopsis of the family Tellinidæ and of the North American species. By William Healey Dall. pp. 285-326, pls. 2-4.
- No. 1211. The pelvic girdle of *Zeuglodon*, *Basilosaurus cetoides* (Owen), with notes on other portions of the skeleton. By Frederic A. Lucas. pp. 327-331, pls. 5-7.
- No. 1212. A new fossil Cyprinoid, *Leuciscus turneri*, from the Miocene of South Dakota. By Frederic A. Lucas. pp. 333, 334, pl. 8.
- No. 1213. A list of fishes collected in Japan by Keinosuke Otaki, and by the United States steamer *Albatross*, with descriptions of fourteen new species. By David Starr Jordan and John Otterbein Snyder. pp. 335-380, pls. 9-20.
- No. 1214. Synopsis of the family Cardiidæ and of the North American species. By William Healey Dall. pp. 381-392.
- No. 1215. Revision of the Orthopteran genus *Trimerotropis*. By Jerome McNeill. pp. 393-449, pl. 21.
- No. 1216. The Hermit Crabs of the *Pagurus bernhardus* type. By James E. Benedict. pp. 451-456.
- No. 1217. On a new species of Spiney-tailed Iguana from Utila Island, Honduras. By Leonhard Stejneger. pp. 467, 468.
- No. 1218. A new systematic name for the Yellow Boa of Jamaica. By Leonhard Stejneger. pp. 467-470.
- No. 1219. Diagnosis of a new species of Iguanoid Lizard from Green Cay, Bahama Islands. By Leonhard Stejneger. p. 471.

- No. 1220. On the Wheatears (*Saxicola*) occurring in North America. By Leonhard Stejneger. pp. 473-481.
- No. 1221. List of fishes collected in the River Pei-Ho, at Tientsin, China, by Noah Fields Drake, with descriptions of seven new species. By James Francis Abbott. pp. 483-491.
- No. 1222. Key to the Isopods of the Atlantic coast of North America, with descriptions of new and little-known species. By Harriet Richardson. pp. 493-579.
- No. 1223. Some spiders and other Arachnida from southern Arizona. By Nathan Banks. pp. 581-590, pl. 22.
- No. 1224. A new Dinosaur, *Stegosaurus marshi*, from the Lower Cretaceous of South Dakota. By Frederic A. Lucas. pp. 591, 592, pls. 23, 24.
- No. 1225. New Diptera in the U. S. National Museum. By D. W. Coquillett. pp. 593-618.
- No. 1226. A list of ferns and fern allies of North America north of Mexico, with principal synonyms and distribution. By William R. Maxon. pp. 619-651.
- No. 1227. A systematic arrangement of the families of the Diptera. By D. W. Coquillett. pp. 653-658.
- No. 1228. A comparison of the osteology of the Jerboas and Jumping Mice. By Marcus W. Lyon, jr. pp. 659-668, pls. 25-27.
- No. 1229. Cambrian Brachiopoda; *Obolus*, subgenus *Glyptius*; *Biccia*; *Obolus*, subgenus *Westonia*; with descriptions of new species. By Charles D. Walcott. pp. 669-695.
- No. 1230. A revision of certain species of plants of the genus *Antennaria*. By Elias Nelson. pp. 697-713.
- No. 1231. Description of new species of Snake from Clarion Island, west coast of Mexico. By Leonhard Stejneger. pp. 715-717.
- No. 1232. On the relationship of the Lutianoid fish, *Aphareus furcatus*. By David Starr Jordan and Edwin Chapin Starks. pp. 719-723, pls. 28, 29.
- No. 1234. The proper names of *Bdellostoma* or *Heptatremia*. By Theodore Gill. pp. 735-738.

CIRCULAR 50.

[Circular requesting information relating to the nesting habits, nests, and eggs of North American birds.] By Richard Rathbun. 1901. pp. [1]-[3].

PAPERS BY OFFICERS OF THE NATIONAL MUSEUM AND OTHERS, BASED WHOLLY OR IN PART UPON THE NATIONAL COLLECTIONS.

ABBOTT, JAMES FRANCIS. List of fishes collected in the River Pei-Ho, at Tientsin, China, by Noah Fields Drake, with descriptions of seven new species.

Proc. U. S. Nat. Mus., XXIII, No. 1221, Feb. 25, 1901, pp. 483-491.

ADLER, CYRUS, and CASANOWICZ, I. M. Descriptive catalogue of a collection of objects of Jewish ceremonial deposited in the U. S. National Museum, by Hadji Ephraim Benguiat.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1899 (1901), pp. 539-561, pls. 1-36.

ALLEN, J. A. List of birds collected in the district of Santa Marta, Colombia, by Mr. Herbert H. Smith.

Bull. Am. Mus. Nat. Hist., XIII, Aug. 25, 1900, pp. 117-184.

This is a list of species collected by Mr. Smith in the Santa Marta region of Colombia, together with the additional species (mentioned in brackets) recorded by Mr. Bangs in earlier papers. Some 380 species are treated, often at considerable length. The list is preceded by an analysis of previous work in this region and a list of papers bearing on the territory under consideration. The following are described as new: *Odontophorus atrifrons*

ALLEN, J. A.—Continued.

(p. 127), *Myiobius assimilis* (p. 144), *Ochthaea jessupi* (p. 151), *O. olivacea* (p. 152), *Attila parvirostris* (p. 153), *Attila rufipectus* (p. 153), *Grallaria bangsi* (p. 159), *Myrmotherula sanctamartæ* (p. 160), and *Hypophylus brunneus* (p. 171).

ASHMEAD, WILLIAM H. The Aculeate Hymenoptera of the islands of St. Vincent and Grenada, with additions to the Parasitic Hymenoptera and a list of the described Hymenoptera of the West Indies.

Trans. Ent. Soc. London, July, 1900, pp. 207-367.

Records the species of the Aculeata taken on these islands by Mr. Herbert H. Smith, gives additions to the Parasitica, and finishes with a complete list of the Hymenoptera of the West Indies. One hundred and three new species are described and 1,291 West Indian species are listed.

Classification of the Ichneumon flies, or the superfamily Ichneumonoidea.

Proc. U. S. Nat. Mus., XXIII, No. 1206, Oct. 13, 1900, pp. 1-220.

This vast superfamily is divided by the author into 6 families (Evaniidae, Agriotypidae, Ichneumonidae, Alysiidae, Braconidae, and Stephanidae), 28 subfamilies, 64 tribes, and 1,146 genera, tables for all of which are given. In his introduction he says that a difference of opinion always has existed and, in the nature of the case, always will exist, as to what constitute sufficient characters for the erection of genera and higher groups; in consequence, he has recognized many genera which are ignored by some authors. A high tribute is paid to Dr. Arnold Förster's work on these insects, upon which, he states, his own work is almost entirely based, he having restored most of Förster's genera and recognized his so-called families as either subfamilies or tribes. A table of the author's superfamilies in the Hymenoptera is reproduced at the beginning of the work, and at the end are tables for the separation of the 94 families into which the order is divided. Eighty genera are new. Lists, with references, are given for the genera which are unknown to the author, and for those which have been incorrectly placed in the Ichneumonoidea. A bibliography of genera, alphabetically arranged, is also included.

Classification of the fossorial, predaaceous, and parasitic wasps, or the superfamily Vespoidea. (Paper No. 3.)

Canadian Entomologist, XXXII, No. 10, Oct., 1900, pp. 295, 296.

Treats of the subfamily Ageniinae and gives a table for separating the six genera placed therein.

ASHMEAD, WILLIAM H. Description of a new genus in the Aphelininae.

Canadian Entomologist, XXXII, No. 11, Nov., 1900, p. 349.

Describes *Myiocnema comperei*, new genus and species, from Brisbane, Queensland, bred from *Lecanium oleæ* Bernard.

Some changes in generic names in the Hymenoptera.

Canadian Entomologist, XXXII, No. 12, Dec., 1900, p. 368.

The author proposes new names for sixteen genera whose original names are preoccupied in other groups of zoology.

Some hymenopterous parasites from dragon-fly eggs.

Entomological News, XI, No. 10, Dec., 1900, pp. 615-617.

Gives descriptions of five species, *Hypertcles polymexæ*, *Tetrastichus polymexæ*, *Brachista pallida*, *Centrobria odonata*, and *Polynema needhami*, all bred from the eggs of species of *Lestes*, by Prof. James G. Needham.

Some new exotic parasitic Hymenoptera.

Entomological News, XI, No. 10, Dec., 1900, pp. 623-630.

Seven new species are described from a collection received for determination from the Städtisches Museum für Natur-, Völker- und Handelskunde at Bremen. Six of these species are from the Chatham Islands, collected by the director of the Bremen museum, Dr. Hugo H. Schauminsland, and the assistant entomologist, Prof. T. D. Alfken. Two new genera of Braconidae are described, *Schauminslandia* and *Doryctomorpha*, and a table for the separation of the subfamilies of the Alysiidae is included.

[Hymenoptera parasitica.]

Psyche, IX, No. 297, Jan., 1901, pp. 147, 148.

Included in "Some insects of the Hudsonian Zone in New Mexico.—II," by Prof. T. D. A. Cockerell. Eight species are listed, six of which are new.

[Hymenoptera (part).]

Psyche, IX, No. 300, Apr., 1901, pp. 185, 186.

Included in "Some insects of the Hudsonian Zone in New Mexico.—IV," by Prof. T. D. A. Cockerell. Six species are listed, two of which are new.

Magrettina, a new genus in the family Mymosidae.

Proc. Ent. Soc. Wash., IV, No. 4, May 25, 1901, pp. 444, 445.

The fossorial wasp, *Meria nocturna* Morawitz, from Turkestan, is here made the type of a new genus which is named in honor of the Italian hymenopterologist, Dr. Paolo Magretti, of Milan.

ASHMEAD, WILLIAM H. Three new parasitic Hymenoptera from South Africa.

Canadian Entomologist, XXXIII, No. 5, May, 1901, pp. 138-140.

Describes *Allotropa lounsburyi* and *Coccidencyrus flavus*, bred from *Dactylopius* sp. on Gorse, and *Tetrastichus prospaltæ*, bred from *Prospalta aurantii* Howard, infesting a *Mytilaspis* sp. on *Salix capensis*.

BANGS, OUTRAM. Notes on a collection of Bahama birds.

Auk, XVII, July, 1900, pp. 283-293, 1 text fig.

Notes on 51 species of Bahama birds, of which the following are described as new: *Speotyto cunicularia cavicola* (p. 287), *Geothlypis maynardi* (p. 290), and *Dendroica ochropus* (p. 292).

——— List of birds collected by W. W. Brown, jr., at Loma del Leon, Panama.

Proc. New England Zool. Club, II, Sept. 20, 1900, pp. 13-34.

An annotated list of 148 species collected by Mr. Brown at Loma del Leon, otherwise known as Lion Hill Station, Panama. Three species are described as new, viz. *Mionectes oleagineus parvus* (p. 20), *Myrmelastes ceterus* (p. 25), and *Salpator lacertus* (p. 31).

——— Birds of San Miguel Island, Panama.

Auk, XVII, Jan., 1901, pp. 24-32.

A list of 42 species, with critical notes on some of them. *Melanerpes seductus* (p. 26), *Phaethornis hyalinus* (p. 27), *Elania sordidata* (p. 28), and *Rhamphocelus limatus* (p. 31), are described as new.

——— A new Honey creeper from San Miguel Island, Panama.

Proc. New England Zool. Club, II, Feb. 8, 1901, pp. 51, 52.

Careba cerinoclinis (p. 52) is described as a new species, related to *C. luteola*.

——— A new Meadow lark from South America.

Proc. New England Zool. Club, II, Feb. 15, 1901, pp. 55, 56.

Sturnella magna paralis (p. 56), from San Sebastian, Colombia, is described as new.

BANKS, NATHAN. New genera and species of American Phalangida.

Journ. N. Y. Ent. Soc., VIII, No. 3, Sept., 1900, p. 199-201.

Describes three new genera and five new species from the United States and Mexico.

——— Some Arachnida from Alabama.

Proc. Acad. Nat. Sci. Phila., Sept., 1900, pp. 529-543.

A list of 145 species from the State, and descriptions of four new species.

BANKS, NATHAN. Camphor secreted by an insect.

Science (new series), XII, No. 304, Oct. 26, 1900, p. 649.

Notes on this subject published by Prof. E. D. Cope many years ago.

——— Two new species of *Troctes*.

Entomological News, XI, No. 8, Oct., 1900, pp. 559, 560.

Describes *T. bicolor* and *T. niger*, with a table for all species of the United States.

——— [Arachnida] [Neuroptera.]

Psyche, IX, No. 295, Nov., 1900, pp. 123, 124.

Included in "Some Insects of the Hudsonian Zone in New Mexico—I," edited by Prof. T. D. A. Cockerell. List of species, with description of one new form.

——— A new species of *Myrmeleon* from Texas.

Entomological News, XI, No. 9, Nov., 1900, p. 596.

Describes *M. texanum*.

——— Papers from the Harriman Alaska Expedition. x. Entomological results (4): The Neuropteroid Insects.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 465-476, pls. XXII-XXVIII, 20 figs.

A list of 34 species with descriptions of 7 new ones.

——— Papers from the Harriman Alaska Expedition. xi. Entomological results (5): The Arachnida.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 477-486, pl. XXIX, 9 figs.

A list of 52 species, with descriptions of 6 new forms.

——— A list of works on North American entomology.

Bull. Div. Ent., U. S. Dept. Agric. (new series), No. 24, 1900, pp. 1-95.

A list of works useful for the study of North American insects.

——— Some spiders and other Arachnida from southern Arizona.

Proc. U. S. Nat. Mus., XXXIII, No. 1223, Feb. 25, 1901, pp. 581-690, pl. XXII, 11 figs.

A list of 35 species from the Territory, with descriptions of 8 new species.

——— Notes on entomology.

Science (new series), XIII, No. 330, Apr. 26, 1901, pp. 668, 669.

A series of miscellaneous notes.

——— Gli Insetti Nocivi.

Science (new series), XIII, No. 331, May 3, 1901, p. 706.

A review of the work of this title by A. Lunardoni and G. Leonardi.

BANKS, NATHAN. Flies as carriers of disease.

Am. Naturalist, XXXV, No. 413, May, 1901, pp. 406, 407.

Review of Dr. Howard's paper on the insect fauna of human excrement.

— A new genus of Endoparasitic Acarians.

Geneeskundig Tijdschrift voor Ned.-Indië, XLI, 2, May, 1901, 3 pp.

Describes a mite found in the lungs of a Javanese monkey.

— A new Ascalaphid from the United States.

Entomological News, XII, No. 6, June, 1901, p. 172.

Describes *Uta albifrons*, and gives a table of the species of the genus in the United States.

— Bibliography of the more important contributions to American economic entomology. Part VII.

U. S. Department of Agriculture, Washington, 1901, pp. 1-113.

Brings the literature down to January 1, 1900.

BARTSCH, PAUL. Birds of the road.

Osprey, IV, 1901, Nos. 11, 12, pp. 162-166, 3 figs.; V, No. 1, pp. 2-6, 4 figs.

These are two popular articles discussing the birds of Washington and its vicinity. Figures of the common forms, and their nests accompany the sketches.

— A trip to the Zoological Park.

Osprey, V, 1901, No. 2, pp. 19-21.

This article deals with the winter birds of the park, and also refers to a number of the caged inhabitants.

BENEDICT, JAMES E. The Hermit crabs of the *Pagurus bernhardus* type.

Proc. U. S. Nat. Mus., XXIII, No. 1216, Jan. 19, 1901, pp. 451-466, 6 text figs.

The seven species referred to this group are described and six of them are figured. The so-called *P. bernhardus* of the Atlantic coast of North America is separated from the European *P. bernhardus* under the name of *P. acadianus*.

BIRTWELL, FRANCIS J. Description of a supposed new subspecies of *Parus* from New Mexico.

Auk, XVIII, April, 1901, pp. 165-167.

Parus gambeli thayeri is described as new.

BISHOP, LOUIS B. Birds of the Yukon region, with notes on other species.

North Am. Fauna, No. 19, Oct. 6, 1900, pp. 47-76.

A fully annotated list of the species met with in the Yukon district.

BREWSTER, WILLIAM, and BANGS, OUTRAM. Description of a new Becard from Lower Uruguay.

Proc. New England Zool. Club, II, Feb. 15, 1901, pp. 53, 54.

Pachyrhamphus notius (p. 53) is described as new. It is most nearly related to *P. polychropterus*.

BUSCK, AUGUST. New species of moths of the superfamily Tineina from Florida.

Proc. U. S. Nat. Mus., XXIII, No. 1208, Oct. 15, 1900, pp. 225-254, pl. I.

Descriptions and life histories of 32 new species. Five new genera are erected. All of the types are in the National Museum.

— New American Tineina.

Journ. N. Y. Ent. Soc., VIII, No. 4, Dec., 1900, pp. 234-248, pl. IX.

Descriptions and life histories of 10 new species. Four new genera are noted. All of the types are in the National Museum.

— A new Canadian Tineid.

Canadian Entomologist, XXXIII, No. 1, Jan. 1901, p. 14.

Description and life history of *Anacampsis lupinella*, with notes on allied species. The types in the U. S. National Museum.

— *Nepticula pomivorella* Packard, alias *Micropteryx pomivorella* Packard.

Canadian Entomologist, XXXIII, No. 2, Feb., 1901, p. 52.

Generic correction and notes on life history of *Nepticula pomivorella* Packard and *Coptodisca splendoriferella* Clem.

— [*Glyphidocera floridanella* n. sp.]

Proc. Ent. Soc. Wash., IV, No. 4, May 25, 1901, p. 475.

The description of this species, prepared by Mr. Busck, is included in a paper by Dr. H. G. Dyar, entitled "Notes on the winter Lepidoptera of Lake Worth, Florida."

CASANOWICZ, I. M. The position of woman in the Talmud.

Am. Anthropologist (new series), III, 1901, pp. 170-172.

— (See also under Cyrus Adler.)

CAUDELL, ANDREW N. Description of larvæ of *Azelina pepylaria* Hubn.

Entomological News, XI, No. 9, Nov., 1900, p. 583.

— Papers from the Harriman Alaska expedition. xv. Entomological results (9): The Orthoptera.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 511, 512.

One species, *Melanoplus borealis* Fieber, is recorded as being the only Orthopteran contained in the collection.

CAUDELL, ANDREW N. The genus *Sinca* of Amyot & Serville.

Journ. N. Y. Ent. Soc., IX, No. 1, Mar., 1901, pp. 1-11, pls. 1, 2, 17 figs.

A synopsis of the genus, with a table for the separation of the species. Twelve of the species are described, one (*Sinca confusa*) being new. The paper is based partly upon Museum material, and the type is in the Museum collection.

— On some Arizona Acridiidae.

Canadian Entomologist, XXXIII, No. 4, Apr., 1901, pp. 102-106.

Gives a list of 11 species, represented by 32 specimens, purchased by the author from the collector, Dr. R. E. Kunze, of Phoenix, Ariz. One of these, *Aræopteryx penelope*, is described as representing a new genus and species. The type is in the National Museum.

CHAPMAN, FRANK M. A study of the genus *Sturnella*.

Bull. Am. Mus. Nat. Hist., XIII, Dec. 31, 1900, pp. 297-320, 8 text figs.

A review of the genus *Sturnella*, mainly devoted to the forms *magna* and *neglecta*. A discussion of the relationships of these two forms, and the geographical variation of each occupies a large share of the paper, while text figures show certain characteristics of the feather markings of the two forms. Seven forms of *Sturnella* are recognized, all of them being treated as subspecies of *Sturnella magna*.

CHITTENDEN, FRANK H. Some insects injurious to the violet, rose, and other ornamental plants.

Bull. Div. Ent., U. S. Dept. Agric., (new series), No. 24, May 18, 1901, pp. 1-144, pls. I-IV, figs. 1-29.

Of violet insects, the following are given special mention: *Phlyctenia rubigalis*, *Emphytus canadensis*, *Tetranychus bimaculatus*, *Rhopalosiphum violæ*, *Diptosis violicola*, *Peridroma saucia*, *Noctua c-nigrum*, *Prodenia commelina*, *P. ornithogalli*, *P. eudiopla*. Brief mention is made of *Laphygma frugiperda*, white grubs (*Lachnosterna arcuata*, *Allothina nitida*, etc.); wireworms (*Agriotes mancus*, etc.); "green aphid" (*Myzus mahaleb* and *Rhopalosiphum dianthi*); *Dactylopius virgatus*; butterfly caterpillars (*Euploicta claudia*, etc.); *Oligia grata*; *Lophoderus trifurcata*; unknown Tortricid; unknown leaf-miner; *Spilosoma virginica*; *Arctia nalis* (?); myriapods, sowbugs, etc.; *Aphodius granarius*. The rose insects especially mentioned are *Penthina nimbata*, *Aramigus fulleri*, *Hoplia callipyge*, *Rhynchites bicolor*, *Cladius pectinicornis*, *Trichius piger*, *Elaphidion villosum*, *Heliothis* (*Chloridia*) *rhœxix*, *Penthina cyanana*, *Cucucia rosaceana*, *C. rosana*, etc. Miscellaneous insects treated are, *Loxostege obliterata* and *Sciara inconstans*.

CHITTENDEN, FRANK H. The destructive Green Pea louse, *Nectarophora destructor* John.

Circ. Div. Ent., U. S. Dept. Agric. (second series), No. 43, May 23, 1901, pp. 1-8, figs. 1-3.

A general account of this species, with a rather full consideration of natural enemies and methods of control.

COOK, ORATOR F. Camphor secreted by an animal (*Polyzonium*).

Science (new series), XII, No. 301, Oct. 5, 1900, pp. 516-521.

An account of camphor secretion by *Polyzonium rosalbum*, with notes on the nature of the various secretions by other Diplopoda.

— Peach yellows: A cause suggested.

Science (new series), XII, No. 310, Dec. 7, 1900, pp. 875-881.

Briefly stated, the proposition is simply that the "yellows" of the peach may be the result of the poisoning of the protoplasm of the living cells by the bite of a small arthropod, probably a mite of the family Phytotidæ.

— *Duoporus*, a new Diplopod from Mexico.

Proc. Ent. Soc. Wash., IV, No. 4, May 3, 1901, pp. 402-404.

Describes *Duoporus*, new genus, and *D. barretti*, new species, from Cuernavaca, Mexico, collected by Mr. O. W. Barrett.

— Priority of place and the method of types.

Science (new series), XIII, No. 331, May 3, 1901, pp. 712, 713.

— A kinetic theory of evolution.

Science (new series), XIII, No. 338, June 21, 1901, pp. 969-978.

COPE, EDWARD DRINKER. The crocodilians, lizards, and snakes of North America.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1898 (1900), pp. 153-1270, pls. 1-36, figs. 1-346.

A posthumous work.

COQUILLET, DANIEL W. Papers from the Harriman Alaska expedition. IX. Entomological results (3): The Diptera.

Proc. Wash. Acad. Sci., II, Dec. 7, 1900, pp. 389-464.

Gives a list of 276 species, with their known distribution, and describes one genus and 63 species as new.

COQUILLET, DANIEL W. A new genus of Ortalidae.

Entomological News, XII, No. 1, Jan., 1901, p. 15.

Describes a new genus and species from the Southern States.

— Three new species of Diptera.

Entomological News, XII, No. 1, Jan., 1901, pp. 16-18.

Describes 3 new species, chiefly from Washington, D. C., obtained by Dr. L. O. Howard while investigating the spreading of diseases by insects.

— New Diptera in the U. S. National Museum.

Proc. U. S. Nat. Mus., XXIII, No. 1225, Mar. 27, 1901, pp. 593-618.

Describes 2 new genera and 71 new species from various parts of the United States.

— A systematic arrangement of the families of the Diptera.

Proc. U. S. Nat. Mus., XXIII, No. 1227, May 2, 1901, pp. 653-658.

Briefly reviews the various attempts that have been made in the past at classifying the families, and gives a modified arrangement, based on recent research.

— Descriptions of three lepidopterous larvæ.

Journ. N. Y. Ent. Soc., IX, No. 2, June, 1901, pp. 85, 86.

Describes the larvæ of *Homacosoma mucidulum* Ragonot, *Ephesiodes gilvescentella* Ragonot, and *Setiosoma fernaldella* Riley.

— [Diptera.]

Pysche, IX, No. 297, 1901, p. 149.

Included in "Some insects of the Hudsonian Zone in New Mexico.—II," edited by Prof. T. D. A. Cockerell. Gives a list of 23 species, with their known distribution, and describes 2 of the species as new.

COUTIÈRE, H. Sur quelques Alpheidae des côtes américaines (Collection de P. U. S. National Museum, Washington).

C. R. Acad. Sci., Paris, CXXXI, No. 5, July, 1900, pp. 356-358.

Preliminary notice of Alpheidae sent by the U. S. National Museum to Dr. Coutière for study. Notes 3 new species, *Alpheus rathbuni*, *A. faxoni* and *Automate rugosa*; places *Athanas ortmanni* Rankin in *Jousseaumea*, and draws several conclusions from the occurrence of vast numbers of *Synalpheus levimanus longicarpus* from a single locality.

COVILLE, FREDERICK V. The tree willows of Alaska.

Proc. Wash. Acad. Sci., II, Oct. 10, 1900, pp. 275-286, pl. xv, figs. a-e.

An account of the 5 tree willows of Alaska, one of them, *Salix amplifolia*, being a new species.

— *Ribes mescaleirum*, an undescribed currant from New Mexico and Texas.

Proc. Biol. Soc. Wash., XIII, Dec. 21, 1900, pp. 195-198.

— The home of *Botrychium pumicola*.

Bull. Torrey Botan. Club, Feb. 28, 1901, pp. 109-111, one plate.

An account of the anomalous habitat of this fern in the pumice gravel at Crater Lake, Oregon.

— *Ribes coloradense*, an undescribed currant from the Rocky Mountains of Colorado.

Proc. Biol. Soc. Wash., XIV, Mar. 9, 1901, pp. 1-6.

— *Juncus columbianus*, an undescribed rush from the Columbia Plains.

Proc. Biol. Soc. Wash., XIV, June 19, 1901, pp. 87-89.

CURRIE, ROLLA P. A new Bird of Paradise.

Proc. U. S. Nat. Mus., XXII, No. 1204, July 7, 1900, pp. 497-499, pl. XVII.

Describes *Cicinnurus lyoggyrus*, new species, from a specimen in the National Museum labeled "New Guinea," received from Monsieur A. Boucard. A table is given showing the important structural differences between this form and *Cicinnurus regius* (Linnæus). The plate gives outline figures of the pectoral shield, head, and tail of each species.

— A dwarf Ant-lion fly.

Proc. Ent. Soc. Wash., IV, No. 4, May 13, 1901, pp. 435-437.

The new genus *Maracandula* is erected for *Myrmelcon pygmaeus* Hagen from Mexico, and the species is redescribed from material recently collected in Madera Canyon, Santa Rita Mountains, Arizona, by Mr. E. A. Schwarz, and at Phoenix, Ariz., by Dr. R. E. Kunzé.

DALL, WILLIAM HEALEY. [Review of] A monograph of Christmas Island.

Science (new series), XII, No. 293, Aug. 10, 1900, pp. 225, 226.

A review of the Monograph on the fauna of Christmas Island, issued by the British Museum.

DALL, WILLIAM HEALEY. A new *Murex* from California.

Nautilus, XIV, No. 4, Aug., 1900, p. 37.

Murex petri, n. sp., is described from San Pedro, Cal., and compared with its allied species.

— Some names which must be discarded.

Nautilus, XIV, No. 4, Aug., 1900, p. 44.

An enumeration of some names which being preoccupied in nomenclature must be replaced by others. *Cistella* Gray, 1853, not Gistel, 1848, is named *Argyrotheca*; *Euryta* H. and A. Adams, 1858, not Gistel, 1848, is named *Mazatlan*; *Glomus* Jeffreys, 1876, not Gistel, 1848, is named *Pristigloma*. By a process of elimination it is shown that *Mitraleria* Schumacher, 1817, must be replaced by *Cheilea* Modeer, 1793.

— [Review of] The Norwegian North Polar Expedition, 1893-1896.

Science (new series), XII, No. 293, Oct. 12, 1900, pp. 562, 563.

A review of the first volume of the "Scientific Results" of Nansen's expedition.

— A new species of *Cerion*.

Nautilus, XIV, No. 6, Oct., 1900, p. 65.

Cerion stervensoni, n. sp., is described from Rum Cay, Bahamas.

— Synopsis of the family Tellinidæ and of the North American species.

Proc. U. S. Nat. Mus., XXIII, No. 1210, Nov. 14, 1900, pp. 285-326, pl. II-IV.

The family is discussed, reviewed, and a new classification proposed for the forms contained in it. The limits of the genera, subgenera and sections contained in the family are newly restricted, and the following new subdivisions are proposed: *Phyllodina*, new section, type *Tellina squamifera* Deshayes; *Merisca*, new section, type *Tellina crystallina* Wood; *Scrobiculina*, new section, type *Scrobicularia viridotincta* Cpr.; *Scissula*, new section, type *Tellina decora* Say; *Peronidia*, new section, type *Tellina albicans* Gmelin; *Psammacoma*, new subgenus, type *Macoma candida* Bertin; *Cydippina*, new section, type *Macoma brevifrons* Say; *Psammotreta*, new section, type *Tellina aurora* Hanley.

The following new species are described and figured: *Tellina* (*Eurytellina*) *georgiana*; *Tellina* (*Liotellina*) *iheringi*; *Tellina* (*Elliptotellina*) *americana*; *Tellina* (*Angulus*) *promera*; *Tellina* (*Angulus*) *flagellum*; *Tellina* (*Angulus*) *colorata*; *Tellina* (*Angulus*) *texana*; *Macoma phenax*, *Macoma* (*Psammacoma*) *extenuata*; and *Macoma* (*Psammacoma*) *tageliformis*; all from the Atlantic coasts of America. The following are new from the Pacific coast: *Tellina* (*Merisca*) *reclusa*; *Tellina* (*Elliptotellina*) *pacifica*; *Tellina* (*Phyllodina*) *pristiphora*; *Tel-*

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lina (*Eurytellina*) *leucogonia*; *Tellina* (*Moerella*) *meropsis*; *Tellina* (*Moerella*) *amianta*; *Tellina* (*Moerella*) *paziana*; *Tellina* (*Angulus*) *macnillii*; *Tellina* (*Angulus*) *suffusa*; *Tellina* (*Angulus*) *cerrosiana*; *Tellina* (*Angulus*) *panamensis*; *Tellina* (*Angulus*) *recurra*; *Tellina* (*Angulus*) *carpenteri*; *Tellina* (*Ondardia*) *buttoni*; *Tellina* (*Peronidia*) *santarosae*; *Macoma krausei*; *Macoma silkana*; *Macoma alaskan*; *Macoma tennirostris*; and *Macoma* (*Psammacoma*) *panamensis*. A number of hitherto unfigured species are illustrated.

— Letter to the editor.

Science (new series), XII, No. 308, Nov. 23, 1900, pp. 808, 809.

A correction of some statements as to the geological relations of South America and the West Indies which had appeared in an article by Professor Bray on the relations of the American floras, in the issue of Nov. 9, 1900.

— Contributions to the Tertiary fauna of Florida. Part v, Teleodermacea: *Solen* to *Diplodonta*.

Trans. Wagner Free Inst. Sci., III, part v, Nov. 28, 1900, pp. 949-1218, pl. xxxvi-xlvii.

This is a continuation of the monographic review of the Tertiary fossils (especially those of the Oligocene and later beds) of the southeastern United States. The types of this work are nearly all in the National Museum collection. The work includes, in most instances, a thorough revision of the nomenclature of each group, an enumeration of the known Tertiary species in American beds, a description with figures of the new or unfigured forms and comparisons with the Pacific coast and other fossil faunas and with the now existing fauna of the adjacent seas. The Oligocene of the West Indian region being practically the same as part of the Floridian beds, is also included in the general revision. The following groups are covered by the present issue: Solenacea, Tellinacea, Isocardiaacea, Cardacea, Leptonacea, and the families Petricolidae, Cooperellidae, and Diplodontidae. The following sections are proposed as new: *Orobittella* in *Montacuta*; *Eretica* and *Rombergia* in *Strigilla*; *Dinocardium* in *Cardium*, *Garum* and *Psammobia* in *Psammobia*; *Platydonax* and *Grammatodonax* in *Donax*; *Semelina* in *Semele*; and the following new species are described and figured: *Abra triangulata*; *Aligena minor*, *A. nuda*; *Alecinus rotundus*; *Ancillaria chipolana*; *Anisodonta americana*, *A. bowdeniana*, *A. carolina*; *Astypis perforata*, *A. burgidula*; *Bornia dodona*, *B. floridana*, *B. mazykii*, *B. plectopygia*; *B. rota*, *B. scintillata*; *Cardium acrocome*, *C. alieula*, *C. aminense*, *C. apateticum*, *C. arestum*, *C. bowdenense*, *C. bulbosum*, *C. burnsi*, *C. cestum*, *C. chipolanum*, *C. compressum*, *C. etnolium*, *C. darwini*, *C. delphicum*, *C. depauperatum*, *C. dominicanum*, *C.*

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druidicum, *C. gatlunense*, *C. malacum*, *C. marylandicum*, *C. maturoense*; *C. odallum*, *C. pansa-trum*, *C. parile*, *C. phylactena*, *C. precursor*, *C. propeiliare*, *C. sturrothi*, *C. tenuioleura*, *C. taphrium*, *C. turtoni*, *C. virile*, *C. wallonianum*, *C. whitii*, *C. willcoxi*; *Chama willcoxi*; *Cooperella carpenteri*; *Crassatallites clarkensis*, *C. densus*, *C. meridionalis*, *C. psychoptera*; *Cyprea chilona*; *Cyrena pompholyx*; *Diplodonta caloosensis*, *D. gabbi*, *D. leana*, *D. minor*, *D. puncturella*, *D. radiata*, *D. shilohensis*, *D. yorkensis*; *Donax chipolana*, *D. curtula*; *Erycina americana*, *E. carolinensis*, *E. chipolana*, *E. curtidens*, *E. fabulina*, *E. kurtzii*, *E. marylandica*, *E. plicatula*, *E. protracta*, *E. undosa*; *Eunaticina caractacus*; *Hindsella acuta*, *H. carolinensis*, *H. donacia*, *H. nephritica*; *Isocardia carolina*, *I. floridana*, *I. gabbi*, *I. hoernesii*; *Kellia triangula*; *Lucina plesiolopha*; *Macoma alumensis*, *M. arctata*, *M. californensis*, *M. conradi*, *M. holmesii*, *M. irma*, *M. kelcyi*, *M. olivella*, *M. tracta*, *M. vendryesi*; *Metis chipolana*, *M. magnificans*, *M. trinitaria*; *Petricola calvertensis*, *P. harrisi*; *Pleurotoma boadicea*, *P. lupenolieri*; *Protocardia janatensis*; *Psammobia clabornensis*, *Rochefortia stantoni*, *R. simpsoni*; *Sacile alumensis*, *S. appressa*, *S. chipolana*, *S. compacta*, *S. cytheroides*, *S. duplinensis*, *S. leana*, *S. lividata*, *S. mutica*, *S. scintillata*, *S. silicata*, *S. smithii*, *S. stearnsii*, *S. striulata*; *Serripes protractus*; *Siliqua oregonia*; *Solen abruptus*, *S. amphistemma*, *S. conradi*; *Sportellulioconcha*, *S. lubrica*, *S. obolus*, *S. plect*, *S. petropolitana*, *S. recessa*, *S. univarinata*, *S. whitfieldi*, *S. yorkensis*; *Tellina acalypsa*, *T. aelonea*, *T. acosmita*, *T. acrocosmia*, *T. agria*, *T. aldrichi*, *T. calliglypta*, *T. caloosana*, *T. chipolana*, *T. cloneta*, *T. cosmanni*, *T. cynoglossa*, *T. dinomera*, *T. dodona*, *T. dupliniana*, *T. eutenia*, *T. halidona*, *T. halistrepta*, *T. hendersoni*, *T. lamprea*, *T. leana*, *T. lepidota*, *T. merula*, *T. mucinella*, *T. phareida*, *T. pressa*, *T. propetencella*, *T. propetenera*, *T. roburina*, *T. sayi*, *T. scapha*, *T. scitula*, *T. sclera*, *T. segregata*, *T. simpsoni*, *T. spillmani*, *T. strophia*, *T. suberis*, *T. umbra*, *Trapezium clabornense*; *Tribra psilis*; *Velorita floridana*; *Venus burnsii*, *V. caloosana*, *V. halidona*, *V. langdoni*, *V. tarquinia*, *V. ulocyna*; *Montacuta actinophora*, *M. chipolana*, *M. claborniana*, *M. floridana*, *M. marina*, *M. petropolitana*, *M. sagriata*.

Recent work on mollusks.

Science (new series), XII, No. 309, Nov. 30, 1900, pp. 822-825.

A résumé of the progress of malacological science during the year, with a summary of some of the more important researches, and some original notes on the Volutacea.

On a genus (*Phyllaplysia*) new to the Pacific coast.

Nautilus, XIV, No. 8, Dec., 1900, pp. 91, 92.
Phyllaplysia taylora, n. sp., from Vancouver Island, is described as new.

DALL, WILLIAM HEALEY. A new species of *Pleurobranchus* from California.

Nautilus, XIV, No. 8, Dec., 1900, p. 92.

Pleurobranchus (*Oscaniella*) *californicus*, n. sp., from San Pedro, Cal., is described.

Synopsis of the family Cardiidae and of the North American species.

Proc. U. S. Nat. Mus., XXIII, No. 1214, Jan. 2, 1901, pp. 381-392.

This paper, like the Synopsis of the *Tellinidae*, includes a revision and classification of the family, bibliography, lists of east and west American species, notes, etc. The following are proposed as new: Section *Acrostergina*, type *Cardium dalli* Heilp.; Section *Trigoniocardia*, type *C. graniferum* Sowerby; *Cardium* (*Trachycardium*) *pristipleura*, new name for *C. maculosum* Sowerby, 1833, not Wood, 1815; *Cardium consors* var. *larum*, new variety; and *C. comocense* new variety of *C. californense* Deshayes.

A new *Lygropecten*.

Nautilus, XIV, No. 10, Feb., 1901, pp. 117, 118.

Pecten (*Lygropecten*) *dilleri*, n. sp., is described from the Upper Miocene of Rio Dell, California.

A new species of *Submarginula* from California.

Nautilus, XIV, No. 11, Mar., 1901, pp. 125, 126.

Submarginula yatesii, n. sp., from Monterey Bay, obtained by Dr. Yates, is described.

Results of the Branner-Agassiz expedition to Brazil. v.—Mollusks from the vicinity of Pernambuco.

Proc. Wash. Acad. Sci., III, Apr., 1901, pp. 139-147.

An annotated list of the species collected, of which *Mulinia branneri* and *Drillia greeleyi* are described as new.

A new Pinna from California.

Nautilus, XIV, No. 12, Apr., 1901, pp. 142, 143.

Atrina oldroydi, n. sp. from San Pedro, Cal., is described, the genus being new to California.

[Review of] Lang's Lehrbuch der vergleichenden Anatomie; Mollusks.

Science (new series), XIII, No. 337, June 14, 1901, pp. 945, 946.

A review of the new edition of Lang's work relating to the Mollusca, edited by Dr. Henschel.

Memorial of George Brown Goode. Goode's activities in relation to American science.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1897 (1901), II, pp. 25-31.

Address delivered at the Goode Memorial meeting of February 13, 1897, and printed in the Museum Report as part of the proceedings of that meeting.

DOANE, R. W. New North American Tipulidæ.

Journ. N. Y. Ent. Soc., VIII, No. 3, Sept., 1900, pp. 182-198, pls. VII, VIII, 43 figs.

Gives descriptions of 44 new species and one new genus.

DWIGHT, JONATHAN, JR. The sequence of plumages and moults of the Passerine birds of New York.

Annals N. Y. Acad. Sci., XIII, Oct., 1900, pp. 73-360, pls. I-VII.

A comprehensive account of the moulting of the Passerine birds of New York, including the sequence of moults and plumages, classification of plumages, and discussion of the theories of color change without moult. The paper is followed by a full bibliography.

— The moult of the North American shore birds (Limicollæ).

Auk, XVII, Oct., 1900, pp. 368-385.

This paper gives an account of the moult in various shore birds, as well as notes on the sequence of moults, time of moulting, and a classification of the plumages in this group of birds.

DYAR, HARRISON G. Partial life history of *Dichogama redtenbacheri* Led.

Canadian Entomologist, XXXII, No. 9, Sept., 1900, pp. 271, 272.

— Note on the genus *Dyaria* Neum.

Canadian Entomologist, XXXII, No. 9, Sept., 1900, p. 284.

Refers this genus to the Pyralidæ, near *Cenodonus*.

— Life history of a South American Slug-caterpillar, *Sibine fusca* Stoll.

Entomological News, XI, No. 7, Sept., 1900, pp. 517-526, pl. XIII, 10 figs.

— Notes on the larval cases of *Lacosomidæ* (Perophoridae) and life history of *Lacosoma chiridota* Grt.

Journ. N. Y. Ent. Soc., VIII, No. 3, Sept., 1900, pp. 177-180, pl. VI, 9 figs.

— Life histories of some North American moths.

Proc. U. S. Nat. Mus., XXIII, No. 1209, Oct. 15, 1900, pp. 255-284.

This paper deals with sixteen species.

— Notes on some North American species of Tineidæ.

Canadian Entomologist, XXXII, No. 10, Oct., 1900, pp. 305-311.

Gives a synopsis of the genera of the Anaphorinæ, and synopses of the species of *Eulepiste*, *Hypoclopus*, *Acrotophus*, and *Pseudanaphora*. One new species is described, *Eulepiste cockerelli*, and there are notes on ten other species.

DYAR, HARRISON G. New species of Anaphorinæ.

Canadian Entomologist, XXXII, No. 11, Nov., 1900, pp. 326-328.

Describes *Atopocera barnesii*, *Neolophus persimplex*, *Ortholophus piger* and *Felderia dorsimacula*. Synopses are given for the species of *Anaphora* and *Ortholophus*.

— Change of preoccupied names.

Canadian Entomologist, XXXII, No. 11, Nov., 1900, p. 347.

Parasa prasina Dyar is changed to *Parasa wellseca*, and the genus *Callaretia* Leech is changed to *Eutrechia*.

— Papers from the Harriman Alaska expedition. XII. Entomological results (6): The Lepidoptera.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 487-501.

A list of 77 species and varieties. Of the nine new species four are described by Prof. John B. Smith, two by Rev. George D. Hulst, one by Dr. R. Ottolengui, one by Dr. C. H. Fernald, and one by Mr. William Beutenmüller.

— Life history of *Callidryas agarithe*.

Entomological News, XI, No. 10, Dec., 1900, pp. 618, 619.

— Supplementary notes on *Orgyia*.

Psyche, IX, No. 296, Dec., 1900, pp. 143, 144.

Notes on *Notolophus oslari* Barnes, and *N. inornata* Beutenmüller.

— A century of larval descriptions.

Entomologist's Record and Journal of Variation, XIII, No. 1, Jan. 15, 1901, pp. 37-41.

A brief review of the descriptive work on lepidopterous larvæ from the middle of the eighteenth to the beginning of the twentieth century. The work done during the last one hundred years is especially dealt with, in order to show what has been accomplished in that time as evidenced in the very greatly increased percentage of larval forms known in Europe and North America, and in the completeness and accuracy of their descriptions. The various larval characters are discussed with a view to determining their value in classification. The paper concludes with a list of the points which are usually covered in the description of larvæ at the present time and without which a larva should not be considered as fully described.

— [Lepidoptera Heterocera (part).]

Psyche, IX, No. 298, Feb., 1901, p. 164.

Included in "Some insects of the Hudsonian Zone in New Mexico.—III," edited by Prof. T. D. A. Cockerell. A list of seven previously described species.

DYAR, HARRISON G. Notes on the genitalia of *Halisdota harrisii* Walsh.

Canadian Entomologist, XXXIII, No. 2, Feb.,

1901, p. 30, 2 figs.

A comparison of the genitalia of *Halisdota harrisii* with those of *H. tessellaris*, in large series, shows the two forms to be distinct species.

— Descriptions of some Pyralid larvæ from southern Florida.

Journ. N. Y. Ent. Soc., IX, No. 1, Mar., 1901, pp. 19-24.

Describes the larvæ of *Margaronia bivitalis* Guenée, *M. infimalis* Guenée, *Sylepta gordialis* Guenée, *S. anormalis* Guenée, *Dichogama amabilis* Möschl., *D. bergii* Möschl., *Epicorsia mellinalis* Hübner, *Terastia mcticulosalis* Guenée, *Agathodes designalis* Guenée, *Desmia laques* Cramer, *Lincodes integra* Zell., and *L. triangularis* Möschl., *Thyridopyralis*, new genus, is described, with *T. gallacrandialis*, new species. The larva of the latter is also described.

— An apparently new Tortricid from Florida.

Journ. N. Y. Ent. Soc., IX, No. 1, Mar., 1901, pp. 24, 25.

Describes *Lophoderus amatana*, new species.

— Note on the larva of *Arctia intermedia*.

Journ. N. Y. Ent. Soc., IX, No. 1, Mar., 1901, pp. 25, 26.

Supplementary to the remarks on page 89, Volume VIII, of this Journal.

— On the fluctuations of the postspiracular tubercle in Noctuid larvæ.

Proc. Ent. Soc. Wash., IV, No. 4, Apr. 24, 1901, pp. 370-373.

Describes the variations in the positions of this tubercle in different species of Noctuidæ and compares the result with an arrangement of the family proposed by Prof. J. B. Smith.

— On certain identifications in the genus *Acronyeta*.

Canadian Entomologist, XXXIII, No. 4, Apr., 1901, p. 122.

Discusses certain changes in synonymy made by Prof. John B. Smith in his paper on pages 333 to 336 of Volume XXXII of the *Canadian Entomologist*.

— A new species of *Bertholdia*.

Proc. Ent. Soc. Wash., IV, No. 4, May 3, 1901, p. 391.

Describes *Bertholdia soror*, new species, from Venezuela, and gives a synopsis of the species in the genus.

DYAR, HARRISON G. A parallel evolution in a certain larval character between the Syntomidæ and the Pericopidæ.

Proc. Ent. Soc. Wash., IV, No. 4, May 3, 1901, pp. 407-409.

Refers to the structure of the thoracic tubercles in these groups. Describes the larvæ of *Daritis howardi* Henry Edwards, and *Gnophæla latipennis* Boisduval.

— Life history of *Callidapteryx dryopterata* Grt.

Proc. Ent. Soc. Wash., IV, No. 4, May 10, 1901, pp. 414-418.

Description of eggs and larval stages of this species. Discusses its systematic position and gives a genealogical tree of the families of the Bombycoidea.

— On the distinction of species in the Cochlidian genus *Sibine*.

Proc. Ent. Soc. Wash., IV, No. 4, May 11, 1901, pp. 422-427.

Describes the male genitalia of five species of *Sibine*. *S. apicalis*, from Mexico, is described as new.

— A division of the genus *Sphingicampa* Walsh, with remarks on the larvæ.

Proc. Ent. Soc. Wash., IV, No. 4, May 13, 1901, pp. 427-430.

Separation of two groups in this genus. Notes on the larvæ of ten species.

— A remarkable Sphinx larva (*Lophostethus dumolinii* Latr.).

Proc. Ent. Soc. Wash., IV, No. 4, May 13, 1901, pp. 440-442.

Description of this larva, showing that the characters of this species may be interpreted as those of a true sphinx, not a Ceratocampid.

— Notes on the winter Lepidoptera of Lake Worth, Florida.

Proc. Ent. Soc. Wash., IV, No. 4, May 25, 1901, pp. 446-485.

A faunal list of this region, with descriptions of a number of larvæ. *Ingura burseræ* Dyar, *Synchlora louisiana* var. *hulstiana* Dyar, *Nola apera* var. *lagunculariæ* Dyar, and *Glyphidocera floridanella* Busck are described as new.

— Note on the larva of *Psaphidia thaxterianus*.

Journ. N. Y. Ent. Soc., IX, No. 2, June, 1901, pp. 84, 85.

— Diagnosis of a new Arctian.

Journ. N. Y. Ent. Soc., IX, No. 2, June, 1901, p. 85.

Describes *Dodia albertæ*, new genus and species, from Calgary, Alberta, Canada.

DYAR, HARRISON G. Life histories of North American Geometridæ, XIII-XXII.

Psyche, IX, No. 292, Aug., 1900, pp. 93, 94; No. 293, Sept., 1900, pp. 106, 107; No. 294, Oct., 1900, pp. 118, 119; No. 295, Nov., 1900, pp. 130-132; No. 296, Dec., 1900, pp. 142, 143; No. 297, Jan., 1901, pp. 155, 156; No. 298, Feb., 1901, pp. 165, 166; No. 299, Mar., 1901, pp. 177-179; No. 300, Apr., 1901, pp. 189-191; No. 301, May, 1901, pp. 203, 204.

EVERMANN, BARTON W., and MARSH, MILLARD C. The fishes of Porto Rico.

Bull. U. S. Fish Com., 1900, pp. 51-350, pls. 1-52.

This paper is included in the general report on the investigations in Porto Rico of the United States Fish Commission steamer *Fish Hawk*, in 1899. It contains a list of 291 species recorded from the Island, twelve of which are here described as new to science.

FERNALD, C. H. New Pyralidæ and Tortricidæ from Palm Beach, Florida.

Jour. N. Y. Ent. Soc., IX, No. 2, June, 1901, pp. 49-52.

Describes eight new species collected or bred by Dr. H. G. Dyar. The types are all in the National Museum.

FONTAINE, W. M. (See under Lester F. Ward.)

GILL, THEODORE. The proper names of *Bdellostoma* or *Heptatrema*.

Proc. U. S. Nat. Mus., XXIII, No. 1234, June 6, 1901, pp. 735-738.

GIRTY, GEORGE H. Devonian fossils from southwestern Colorado. The fauna of the Ouray limestone.

20th Ann. Rep. U. S. Geol. Surv., 1900, pp. 25-81, pls. 3-7.

Describes the basal Upper Devonian faunas of southwestern Colorado, a part of which had heretofore been regarded as of Carboniferous age. The author concludes that the Ouray limestone fauna mostly resembles the 'Athabasca fauna described by Whiteaves, which he justly concludes to be of about the same age as the Tully limestone of the New York section.'

The entire material was transmitted to this Museum under accession No. 35935 and is registered under Catalogue Nos. 33905-33988.

GRINNELL, JOSEPH. The intermediate Wren-tit.

Condor, II, July-Aug., 1900. pp. 85-86.

Chamaea fasciata intermedia (p. 86), is described as new.

GRINNELL, JOSEPH. Birds of the Kotzebue Sound region of Alaska.

Pacific Coast Avifauna, No. 1, Nov. 14, 1900, pp. 1-80, 1 map.

A report on the birds of the Kotzebue Sound region, based on a year's observations in this part of Alaska. One hundred and thirteen are listed species; in some cases extensive notes are added. *Lanius borealis inivictus* is described as new. A useful bibliography is appended to this paper.

HEIDEMANN, OTTO. A new species of Tingitidæ.

Canadian Entomologist, XXXI, No. 10, Oct., 1899, pp. 301, 302.

Describes *Gargaphia angulata*. (Omitted by mistake from last year's report.)

—— Papers from the Harriman Alaska expedition. XIII. Entomological results (7): The Heteroptera.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 503-506.

This paper contains a list of Hemiptera-Heteroptera collected by Prof. T. Kincaid. The 17 species are mostly well known.

—— Note on *Aradus* (*Quilbus*) *niger* Stal.

Proc. Ent. Soc. Wash., IV, No. 4, May 3, 1901, pp. 389, 390.

Account of the capture, by the author, of several specimens of this interesting species in the woods near Soldiers' Home, D. C. This is the first time it has been recorded since it was originally described by Stal from "Carolina meridionalis."

—— Remarks on the Spittle insect, *Clastoptera xanthocephala* Germ.

Proc. Ent. Soc. Wash., IV, No. 4, May 3, 1901, pp. 399-402, pl. VI, 8 figs.

Gives the habits and life history of this species as observed by Mr. Heidemann on stems of chrysanthemums and on the rag weed (*Ambrosia artemisiifolia*). Another species, *Clastoptera obtusa* Say, has been observed by Dr. J. A. Lintner, and also by the writer, living upon black alder. Reference is made to the literature on spittle insects and to the common beliefs and superstitions at one time held by people in regard to the origin of the spittle-like masses.

The plate figures the insect in its different stages, a chrysanthemum branch with the mass of "spittle," and the anal segments of the insect with the aperture as it appears when open and closed.

HENSHAW, H. W. Occurrence of *Larus glaucescens* and other American birds in Hawaii.

Auk, XVII, July, 1900, pp. 201-206.

Notes on six species of birds occasionally found on the island of Hawaii.

HENSHAW, H. W. Description of a new Shearwater from the Hawaiian Islands.

Auk, xvii, July, 1900, pp. 246, 247.

Puffinus novelli is described as new.

—— The Yellow-billed Tropic bird in the Hawaiian Islands.

Auk, xviii, Jan., 1901, p. 105.

A note on the occurrence of this species in the island of Hawaii.

—— Occurrence of *Tringa maculata* and other American birds in Hawaii.

Auk, xviii, Apr., 1901, p. 202.

Notes on 6 species of American birds found during migrations on the island of Hawaii.

HOLMES, WILLIAM H. The obsidian mines of Hidalgo, Mexico.

Am. Anthropologist (new series), ii, July-Sept., 1900, pp. 405-416, pls. 1-16.

—— Review of the evidence relating to auriferous gravel man in California.

Rep. Smithsonian Inst., 1899 (1901), pp. 419-472, pls. 1-XVI.

HOUGH, WALTER. An early West Virginia pottery.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1899 (1901), pp. 511-521, pls. 1-18.

HOWARD, LELAND O. The differences between malarial and nonmalarial mosquitoes.

Scientific American, LXXXIII, No. 1, July 7, 1900, pp. 8, 9, 1 pl.

Gives full life round of *Anopheles quadrimaculatus*.

—— Diptera collected in Hawaii by H. W. Henshaw.

Proc. Ent. Soc. Wash., iv, No. 4, July 16, 1900, pp. 489, 490.

—— Notes on the mosquitoes of the United States, giving some account of their structure and biology, with remarks on remedies.

Bull. Div. Ent., U. S. Dept. Agric. (new series), No. 25, Aug. 23, 1900, pp. 1-70, 22 figs.

This paper is sufficiently well described in its title, except that it includes an analytical table of North American mosquitoes prepared by D. W. Coquillett.

—— Two interesting uses of insects by natives in Natal.

Scientific American, LXXXIII, No. 17, Oct. 27, 1900, p. 267, 3 figs.

Notes on the use of cocoons of *Ageronia mimosa* as anklets and wax of *Ceroplastes* as head rings.

HOWARD, LELAND O. Establishment of a beneficial insect in California.

Bull. Div. Ent., U. S. Dept. Agric. (new series), No. 26, Nov. 1, 1900, pp. 16, 17.

An account of the introduction of *Scutellista cyanea* Mots., from South Africa into California and its establishment at San Jose as a parasite of *Locanium oleae* Bern.

—— Beneficial work of *Hyperaspis signata*.

Bull. Div. Ent., U. S. Dept. Agric. (new series), No. 26, Nov. 1, 1900, pp. 17, 18, 1 fig.

Destruction of *Pulvinaria acericola* at Knoxville, Tenn., by this Coccinellid whose larva superficially resembles *Dactylopius*.

—— The Ulke collection of Coleoptera.

Science (new series), xii, No. 311, Dec. 14, 1900, pp. 918-920.

A summary of the character of this great collection and of the services of Henry Ulke to Coleopterology. The collection was purchased by the Carnegie Museum at Pittsburg, Pa.

—— The structure and life history of the Harlequin fly (*Chironomus*).

Science (new series), xii, No. 312, Dec. 21, 1900, pp. 363, 364.

Review of book by L. C. Miall and A. R. Hammond.

—— Contributions a l'étude des hyménoptères entomophages.

Science (new series), xii, No. 312, Dec. 21, 1900, pp. 961-963.

Review of paper by L. G. Seuret.

—— A contribution to the study of the insect fauna of human excrement.

Proc. Wash. Acad. Sci., ii, Dec. 28, 1900, pp. 541-604, figs. 17-38, pls. xxx, xxxi.

The exact details of a prolonged investigation, extending through two years, with full lists of the species studied and specific accounts of all the Diptera (77 species). Many new facts relating to the biology of certain forms are presented.

—— Remarks on *Psorophora ciliata*, with notes on its early stages.

Canadian Entomologist, xxxii, No. 12, Dec., 1900, pp. 353-357, 3 figs.

The first published descriptions of the larvæ and pupæ of this genus, and an account of the localities in which they were found, and the conditions under which they live.

—— Regulations of foreign governments regarding importation of American plants, trees, and fruits.

Circ. Div. Ent., U. S. Dept. Agric. (second series), No. 41, 1900, pp. 1-4.

A compilation of the regulations described for the use of American exporters of plants, trees, and fruits.

HOWARD, LELAND O. Smyrna fig culture in the United States.

Yearbook U. S. Dept. Agric., 1900, pp. 77-106, 8 pls., 7 figs.

An account of the attempts to grow the Smyrna fig in this country, of the successful introduction of *Blastophaga grossorum* from Algeria by the Department of Agriculture, and an account of the practical work carried on through the summer of 1900 at Fresno, Cal., under the supervision of Mr. E. A. Schwarz, who was detailed by the Department of Agriculture, for this purpose; also an account of the life history of *Blastophaga*.

— Flies and typhoid fever.

Popular Science Monthly, LVIII, No. 3, Jan., 1901, pp. 249-256, 11 figs. (Published Dec. 28, 1900.)

A succinct résumé of the results of the investigations of which a detailed account is given in the following paper.

— The attitude of the State toward scientific investigation.

Science (new series), XIII, No. 316, Jan. 18, 1901, pp. 87-96.

An abstract of this paper was published in *Nature*, Feb. 7, 1901, pp. 357, 358.

Part of a public discussion before the American Society of Naturalists at the Baltimore meeting, December, 1900, in which the work of the United States Government in zoology was especially considered.

— A new industry brought by an insect.

Forum, XXX, No. 5, Jan., 1901, pp. 605-607. (Published Dec. 29, 1900.)

A brief account of the introduction and establishment of *Blastophaga grossorum* in the fig orchards of George C. Roeding, of Fresno, Cal.

— Some diptera bred from cow dung.

Canadian Entomologist, XXXIII, No. 2, Feb., 1901, pp. 42-44.

A list of species of Diptera (determined by Mr. Coquillett) reared from cow dung at the Department of Agriculture in 1890, with remarks on coprophagous insects.

— Malaria and certain mosquitoes.

Century Magazine, LXI, No. 6, Apr., 1901, pp. 941-949, 14 figs.

A rather popular article, giving an account of the development of the malarial organism and the biology of the malaria-bearing mosquitoes of the genus *Anopheles*.

— Mosquitoes, how they live, how they carry disease, how they are classified, and how they may be destroyed.

New York (McClure, Phillips & Co.), June 3, 1901, pp. xv, 241, 1 pl., 50 figs.

A full, popular treatise on mosquitoes, especially directed towards the disease-transfer function and methods of extermination.

HOWARD, LELAND O. Fighting pests with insect foes.

Everybody's Magazine, v, June, 1901, pp. 572-577, 9 figs.

An account of the introduction of certain beneficial insects into the United States and other countries for the purpose of destroying injurious species, together with a brief mention of the introduction of the South African locust fungus for practical use against western grasshoppers.

— The death-bringing House fly.

Good Housekeeping, XXXII, No. 6, June, 1901, pp. 461, 462, 2 figs.

The habits and life history of *Musca domestica*, its relation to the human economy, and the remedies to be used.

HOWE, REGINALD HEBER, Jr. A new subspecies of the genus *Hylocichla*.

Auk, XVII, July, 1900, pp. 270, 271.

Hylocichla fuscescens fuliginosa (p. 271) is described as new.

— A study of the genus *Macrorhamphus*.

Auk, XVIII, Apr., 1901, pp. 157-162, 1 map.

A study of the two American species of the genus convinces Mr. Howe that the form *scalopaceus* should be reduced to a subspecies of *M. griseus*. A description of the characteristic features of the plumage of each form is given, and a map showing the breeding range and the migration routes of each form accompanies the paper.

— Variation in size in the Wood pewee.

Auk, XVIII, Apr., 1901, p. 194.

A series of measurements of the Wood-pewee from the northern and southern parts of its range.

HUBBARD, HENRY G. Letters from the Southwest. Insect fauna in the burrows of desert rodents.^a

Proc. Ent. Soc. Wash., IV, No. 4, Apr. 24, 1901, pp. 361-364.

Some burrows of spermophiles and the Kangaroo rat were explored by the writer at Palm Springs in the Colorado Desert of California.

Quite a number of insects were thus found, the most interesting being three species of the Coleopterous family Histeridae. Two of these belong to new genera allied to *Cheliocenus*, which inhabits the burrows of the Florida land tortoise.

— Letters from the Southwest. The Colorado Desert.^a

Proc. Ent. Soc. Wash., IV, No. 4, Apr. 24, 1901, pp. 374-376.

A general description of the Colorado Desert to serve as an introduction to the next paper.

^a A posthumous paper.

HUBBARD, HENRY G. Letters from the Southwest. Salton Lake in the Colorado Desert, and its insect fauna.^a

Proc. Ent. Soc. Wash., IV, No. 4, Apr. 24, 1901, pp. 376-378.

An enumeration of the insects observed by the writer during one day's collecting at the so-called Salton Lake, with notes on their mode of occurrence. The saline fauna of that locality, both of aquatic and terrestrial species, is not a rich one.

——— Insect fauna of *Dasyllirion wheeleri*.^a

Proc. Ent. Soc. Wash., IV, No. 4, May 3, 1901, pp. 381, 382.

Young and vigorous *Dasyllirion* plants in southern Arizona do not seem to be infested by insects, but partly decayed plants harbor numerous insects, mostly Coleoptera, many of which are not yet described and are peculiar to this plant.

——— Insect life in Florida caves.^a

Proc. Ent. Soc. Wash., IV, No. 4, May 3, 1901, pp. 394-396.

A brief account of the insects observed in several caves of Hernando and Citrus counties, Fla.

JORDAN, DAVID STARR, and SNYDER, JOHN OTTERBEIN. A list of fishes collected in Japan by Keinosuke Otaki, and by the United States steamer *Albatross*, with descriptions of fourteen new species.

Proc. U. S. Nat. Mus., XXIII, No. 1213, Dec. 10, 1900, pp. 335-380, pls. IX-XX.

JORDAN, DAVID STARR, and STARKS, EDWIN CHAPIN. On the relationships of the Lutianoid fish, *Aphareus furcatus*.

Proc. U. S. Nat. Mus., XXIII, No. 1232, June 21, 1901, pp. 719-723, pls. XXVIII, XXIX.

KINCAID, TREVOR. Papers from the Harriman Alaska expedition. VII. Entomological results (1): The Tenthredinoidea.

Proc. Wash. Acad. Sci., II, Nov. 24, 1900, pp. 341-365.

Introduction concerning the arthropoda of Alaska, a résumé of the localities visited, and the insects, spiders, mites, and myriapods collected by the author on this expedition. The body of the paper consists of a report upon 56 species of saw-flies, 32 of which are described as new.

——— Papers from the Harriman Alaska expedition. VIII. Entomological results (2): The metamorphoses of some Alaskan Coleoptera.

Proc. Wash. Acad. Sci., II, Nov. 24, 1900, pp. 367-388, pls. XXII-XXVI, 41 figs.

Describes and figures the immature stages of nine species.

KINCAID, TREVOR. Papers from the Harriman Alaska expedition. XIV. Entomological results (8): The Sphegoidea and Vespoidea.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 507-510.

A list of nine species, two of which are here described for the first time.

KNOWLTON, FRANK HALL. Fossil plants of the Esmeralda formation.

21st Ann. Rep. U. S. Geol. Surv., 1900, pt. II, pp. 200-222, pl. XXX.

This paper contains the description of a collection of fossil plants from the vicinity of Silver Peak in Esmeralda County, Nev. Sixteen species are described, all but one of them being new. The beds are lake beds of fresh-water origin and probably of the Miocene Age.

——— Fossil hickory nuts.

Plant World, IV, 1901, pp. 51-52.

This paper mentions some fossil hickory nuts (*Archihicoria siouensis*) from the Bad Lands of Sioux County, Nebr., specimens of which are now in the Museum collections.

——— A fossil flower.

Plant World, IV, 1901, pp. 73, 74.

This paper describes a flower of *Hydrangea* from the Mascall beds of the John Day Basin, Oregon.

(See also under Lester F. Ward.)

LUCAS, FREDERIC A. The lachrymal bone in pinnipeds.

Science (new series), XII, July 27, 1900, p. 150.

It is noted that this bone occurs in embryonic and very young eared seals.

——— A new rhinoceros, *Trigonias osborni*, from the Miocene of South Dakota.

Proc. U. S. Nat. Mus., XXIII, No. 1207, Oct. 9, 1900, pp. 221-223, figs. 1, 2.

A new genus and species, characterized by a full set of incisors in the upper jaw. The lower procumbent tooth, usually called a canine, is shown to be an incisor.

——— The pelvic girdle of *Zeuglodon*, *Basilosaurus cetoides* (Owen), with notes on other portions of the skeleton.

Proc. U. S. Nat. Mus., XXIII, No. 1211, Nov. 8, 1900, pp. 327-331, pls. V-VII.

Describes the pelvis and femur for the first time, and gives characters of the genera *Basilosaurus* and *Dorulon*.

——— A new fossil cyprinoid, *Leuciscus turneri*, from the Miocene of Nevada.

Proc. U. S. Nat. Mus., XXIII, No. 1212, Nov. 8, 1900, pp. 333, 334, pl. VIII.

^aA posthumous paper.

LUCAS, FREDERIC A. Paleontological notes.

Science (new series), XII, Nov. 23, 1900, pp. 809, 810.

Includes *Thespesius* vs. *Clasosaurus*; A new locality for *Thespesius*; The dentition, hyoid, and cranial cavity of *Basilosaurus*.

— A new Dinosaur, *Stegosaurus marshi*, from the Lower Cretaceous of South Dakota.

Proc. U. S. Nat. Mus., XXIII, No. 1224, Feb. 26, 1901, pp. 591, 592, pls. XXIII, XXIV.

— Description of skull of *Lepidosteus atrox*. [Fossil Lepidosteids from the Green River shales of Wyoming, by C. R. Eastman.]

Bull. Mus. Comp. Zool., Cambridge, XXXVI, No. 3, Aug. 29, 1900, p. 73.

— Characters and relations of *Gallinuloides*, a fossil gallinaceous bird from the Green River shales of Wyoming.

Bull. Mus. Comp. Zool., Cambridge, XXXVI, No. 4, Aug. 28, 1900, pp. 79-84, pl. 1, one text figure.

Describes the structure of this bird in detail and compares it with recent gallinaceous birds. It is shown to be very closely related to the Curassows.

LYON, MARCUS W., Jr. A comparison of the osteology of the Jerboas and Jumping mice.

Proc. U. S. Nat. Mus., XXIII, No. 1228, May 2, 1901, pp. 659-668, pls. XXV-XXVII.

MCNEILL, JEROME. Revision of the Orthopteran genus *Trimerotropis*.

Proc. U. S. Nat. Mus., XXIII, No. 1215, Jan. 19, 1901, pp. 393-419, pl. XXI, 6 figs.

Trimerotropis belongs to a group of genera which have the median carina of the pronotum cut by two transverse furrows. A table is given for separating the genera of this group, two of these, *Melator* and *Trepidulus*, being new. A key is given for the 13 groups and 51 species into which *Trimerotropis* is divided, while one subgenus, *Agonozoa*, and 24 of the species are described as new.

MARLATT, C. L. The scale insect and mite enemies of citrus trees.

Yearbook U. S. Dept. Agric., 1900, pp. 247-290, pls. XXVI-XXXI, figs. 9-33.

An enumeration of the more important of this class of insects, their life histories, natural enemies, remedies, and distribution. The paper was published in separate form in June, 1901.

MARLATT, C. L. How to control the San Jose scale.

Circ. Dir. Ent., U. S. Dept. Agric., No. 42 (second series), Oct. 22, 1900, pp. 1-6.

Describes the various methods of winter treatment for this scale insect.

— The European pear scale, *Diaspis piricola* (Del Guercio) Saccardo, 1895.

Entomological News, XI, No. 9, Nov., 1900, pp. 590-594.

Bibliography, synonymy, and notes on the occurrence of this species in the United States.

— Important insecticides. Directions for their preparation and use. (A revision of *Farmers' Bulletin* No. 19.)

Farmers' Bull., U. S. Dept. Agric., No. 127, Feb. 6, 1901, pp. 1-42, 6 figs.

— The principal insect enemies of growing wheat.

Farmers' Bull., U. S. Dept. Agric., No. 132, April 6, 1901, 40 pp., 25 figs.

Life histories and natural enemies of and remedies against these insects.

MARSH, MILLARD C. (See under Barton W. Evermann.)

MASON, OTIS TUFTON. Traps of the Amerinds.

Proc. Am. Assoc. Adv. Sci., XLIX, 1900, pp. 301-313.

Discusses the subject of traps from the side of invention and shows their salutary influence in mind growth.

— A primitive frame for weaving narrow fabrics.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1899 (1901), pp. 485-510, pls. 1-9, figs. 1-19.

Traces a simple device for weaving from the Indians in the Mississippi Valley and the Pueblo region, through New England, and thence to European countries.

— The pointed bark canoes of the Kootenai and the Amur.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1899 (1901), pp. 523-537, pls. 1-5, figs. 1-6.

Calls attention to the similarity between the bark canoes of the Kootenai River, in Washington, and those of the Amur, in having both ends pointed below the water line. The paper includes notes on the Kootenai canoe by Meriden S. Hill.

MAXON, WILLIAM R. Notes on American ferns: II.

Fern Bull., VIII, 1900, pp. 58, 59.

A discussion regarding a fern referred tentatively to *Polypodium vulgare acutum* Moore.

MAXON, WILLIAM R. Notes on American ferns: III.

Fern Bull., VIII, 1900, pp. 84, 85.

History of the discovery of *Trichomanes petersii* A. Gray in the only (three) localities known. *Polka densa* (Brack.) Hook. is reported from the vicinity of Durham, Ontario.

— The Hart's-tongue in New York and Tennessee.

Plant World, III, 1900, pp. 129-132, pl. 4.

A description of the habitat of this species in central New York and in Tennessee, with an account of its rediscovery in the latter region.

— On the occurrence of the Hart's-tongue in America.

Fernwort Papers. [Published by the Linnean Fern Chapter], 1900, pp. 30-46.

Treats at length of the distribution of this species, *Phyllitis scolopendrium* (L.) Newm., in North America, including description of habitat and known data relating to the several stations. Specimens collected in Chiapas, Mexico, are regarded as representing a distinct species, *Phyllitis lindeni* (Hook.) Maxon.

— *Polypodium vulgare oreophilum* Maxon, subsp. nov. [In Morris: Some plants of West Virginia.]

Proc. Biol. Soc. Wash., XIII, 1900, p. 174.

A description of the fern previously referred to *Polypodium vulgare acutum* Moore.

— *Polypodium hesperium*, a new fern from western North America.

Proc. Biol. Soc. Wash., XIII, 1900, pp. 199, 200.

A brief discussion of the aggregate *Polypodium vulgare* L., followed by a description of the new species mentioned in the title, which occurs commonly in the mountains of the western United States.

— A list of the Pteridophyta collected in Alaska in 1900 by Mr. J. B. Flett, with description of a new *Dryopteris*.

Bull. Torrey Bot. Club, XXVII, 1900, pp. 637-641.

Twenty-three species are listed, one of which, *Dryopteris aquilonaris*, from Nome City, is described as new.

— Notes on the validity of *Asplenium cheimoides* as a species.

Botan. Gaz., XXV, 1900, pp. 410-415.

A review of what has been written on the subject. The hybridity of ferns in general is discussed briefly, and the tentative proposition advanced that the fern in question may be a fertile hybrid.

MAXON, WILLIAM R. A list of the ferns and fern allies of North America north of Mexico, with principal synonyms and distribution.

Proc. U. S. Nat. Mus., XXIII, p. 1226, May 4, 1901, pp. 619-651.

The list proper is preceded by an introduction, which is largely historical and includes a list of the principal papers and books treating of the ferns of the United States and Canada. The following new combinations are made: *Pteridium caudatum* (L.) Maxon; *Dryopteris orcopteris* (Sw.) Maxon; *Woodsia obtusa plummerae* (Lemmon) Maxon; *Isoetes paupercula* (Engelm.) A. A. Eaton; *Isoetes canadensis* (Engelm.) A. A. Eaton; and the new names *Polypodium vulgare decipitum* Maxon and *Lycopodium chapmani* Underw. are proposed.

MERRILL, GEORGE P. Guide to the study of the collections in the Section of Applied Geology: The nonmetallic minerals.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1899 (1901), pp. 155-483, pls. 1-50.

Designed primarily as a handbook, this work gives a very exhaustive account of the occurrence and uses of nonmetallic minerals as represented in the Museum collections.

MERRILL, GEORGE P., and STOKES, H. N. A new stony meteorite from Allegan, Mich., and a new iron meteorite from Mart, Tex.

Proc. Wash. Acad. Sci., II, July 25, 1900, pp. 41-68.

This paper gives an account of the fall and presents the results of microscopic and chemical examinations of the Allegan stone, and chemical analyses of the iron.

MILLER, GERRIT S., Jr. The Giant squirrels of Burmah and the Malay Peninsula.

Proc. Wash. Acad. Sci., II, July 25, 1900, pp. 69-77.

New species: *Ratufa melanopepla* (p. 71), and *R. pyrronota* (p. 75).

— Descriptions of two new squirrels from Trong, Lower Siam.

Proc. Wash. Acad. Sci., II, July 25, 1900, pp. 79-81.

New subspecies: *Sciurus notatus miniatus* (p. 79) and *S. tenuis surdus* (p. 80).

— Preliminary revision of the European Redbacked mice.

Proc. Wash. Acad. Sci., II, July 26, 1900, pp. 83-109.

New: *Crasomys* (subgenus, p. 87), *Evotomys norvegicus* (p. 93), *Evotomys vasconae* (p. 96),

MILLER, GERRIT S., Jr.—Continued.

Erotomys hereynicusshelleyensis (p. 98), *Erotomys hereynicus succicus* (p. 101), *Erotomys hereynicus britannicus* (p. 103).

——— Mammals collected by Dr. W. L. Abbott on islands in the South China Sea.

Proc. Wash. Acad. Sci., II, Aug. 20, 1900, pp. 203-216, figs. 10-16.

New species: *Mus flaviventer* (p. 204), *Mus anambae* (p. 205), *Mus lingensis* (p. 206), *Mus strepitans* (p. 207), *Mus tiomanicus* (p. 209), *Mus siamianus* (p. 210), *Mus tambelanicus* (p. 212), *Mus obscurus* (p. 213), *Ratufa anambae* (p. 215), *Ratufa tiomanensis* (p. 216), *Funambulus castaneus* (p. 217), *Sciurus mimellus* (p. 218), *Sciurus mimicus* (p. 219), *Sciurus tenuirostris* (p. 221), *Sciurus anambensis* (p. 223), *Sciurus abbotii* (p. 224), *Sciurus klossii* (p. 225), *Tragulus rufulus* (p. 227), *Tupaia lunoe* (p. 229), *Tupaia sordida* (p. 231), *Tupaia chrysomalla* (p. 232), *Hipposideros barbensis* (p. 233), *Rhinolophus minutus* (p. 235), *Emballonura anambensis* (p. 236), *Pteropus lepidus* (p. 237), and *Muretus pumilus* (p. 241).

——— A second collection of bats from the island of Curaçao.

Proc. Biol. Soc. Wash., XIII, Oct. 31, 1900, pp. 159-162.

New species: *Mormoops intermedia* (p. 160), *Natalus tumidirostris* (p. 160), and *Molossus pygmaeus* (p. 162).

——— A new Gerbille from eastern Turkestan.

Proc. Biol. Soc. Wash., XIII, Oct. 31, 1900, pp. 163, 164.

New species: *Gerbillus arenicolor* (p. 163).

——— A new Freetail bat from Central America.

Ann. and Mag. Nat. Hist. (series 7), VI, Nov. 1900, pp. 471, 472.

New species: *Promops nanus* (p. 471). Based in part on material belonging to the British Museum.

——— Key to the land mammals of eastern North America.

Bull. N. Y. State Mus., VIII, Oct. (Nov. 21, 1900), pp. 61-160.

New subspecies: *Odocoileus americanus borealis* (p. 83).

——— A new Mouse deer from Lower Siam.

Proc. Biol. Soc. Wash., XIII, Dec. 21, 1900, pp. 185, 186.

New species. *Tragulus canescens* (p. 185).

MILLER, GERRIT S., Jr. Mammals collected by Dr. W. L. Abbott on Pulo Lankawi and the Butang Islands.

Proc. Biol. Soc. Wash., XIII, Dec. 21, 1900, pp. 187-193.

New: *Mus vociferans lancarensis* (p. 188), *Mus surifer flavidulus* (p. 189), *Mus surifer butangensis* (p. 190), *Mus pannosus* (p. 190), and *Tragulus ambrinus* (p. 191).

——— A collection of small mammals from Mount Coffee, Liberia.

Proc. Wash. Acad. Sci., II, Dec. 28, 1900, pp. 631-649, figs. 39-43.

New: *Sciurus rufobrachiatulibericus* (p. 633), *Mus defua* (p. 635), *Mus tullbergi rostratus* (p. 637), *Dasygnys rufulus* (p. 639), *Arvicanthus planifrons* (p. 641), *Myosorex muricanda* (p. 645), and *Pipistrellus minusculus* (p. 647).

——— A new bat from Peru.

Ann. and Mag. Nat. Hist. (series 7), VI, Dec., 1900, pp. 570-574, 1 fig.

New: *Tomopeas* (p. 570), *Tomopeas rarus* (p. 571). Based in part on material belonging to the British Museum.

——— Mammals collected by Dr. W. L. Abbott on the Natuna Islands.

Proc. Wash. Acad. Sci., III, Mar. 26, 1901, pp. 111-138.

New species: *Tragulus bungaracensis* (p. 113), *Tragulus pallidus* (p. 116), *Sus natunensis* (p. 117), *Mus integer* (p. 119), *Sciurus procerus* (p. 122), *Sciurus lungungensis* (p. 123), *Sciurus lutescens* (p. 124), *Sciurus rufus* (p. 125), *Sciurus cutiventris* (p. 126), *Sciurus rubriventris* (p. 127), *Sciurus lautensis* (p. 128), *Ratufa angusticeps* (p. 130), *Actogalidia inornata* (p. 131), *Tupaia sirihassensis* (p. 133), *Pipistrellus subulidens* (p. 134), and *Rhinolophus spadix* (p. 136).

——— The subgenus *Rhinosciurus* of Trouessart.

Proc. Biol. Soc. Wash., XIV, Apr. 2, 1901, p. 23.

New genus: *Sciurotamias* (p. 23).

——— A new squirrel from Borneo.

Proc. Biol. Soc. Wash., XIV, Apr. 5, 1901, pp. 33, 34.

New species: *Sciurus parvus* (p. 33).

——— A new deer from Costa Rica.

Proc. Biol. Soc. Wash., XIV, Apr. 25, 1901, pp. 35-37.

New species: *Odocoileus costaricensis* (p. 35).

——— A new dormouse from Italy.

Proc. Biol. Soc. Wash., XIV, Apr. 25, 1901, pp. 39, 40.

New species: *Eliomys cincticauda* (p. 39).

MILLER, GERRIT S., JR. Five new shrews from Europe.

Proc. Biol. Soc. Wash., XIV, Apr. 25, 1901, pp. 41-45.

New: *Crocicidura sicula* (p. 41), *Crocicidura caudata* (p. 42), *Sorex araneus alticola* (p. 43), *Sorex araneus carinatus* (p. 44), *Neomys fodiens minor* (p. 45).

——— A new shrew from Switzerland.

Proc. Biol. Soc. Wash., XIV, June 27, 1901, pp. 95, 96.

New species: *Crocicidura mimula* (p. 95).

——— The Alpine varying hare.

Proc. Biol. Soc. Wash., XIV, June 27, 1901, pp. 97, 98.

New species: *Lepus varronis* (p. 97).

NELSON, E. W. Descriptions of thirty new North American birds in the Biological Survey collection.

Auk, XVII, July, 1900, pp. 253-270.

The following species are described for the first time: *Crypturus inornatus* (p. 253), *Dendrotyx macronus dilatus* (p. 254), *Cyrtonyx montezumae mcrausii* (p. 255), *Amazona oratrix tresmarie* (p. 256), *Momotus lessonae goldmani* (p. 256), *Melanerpes frontalis* (p. 257), *M. sudamerici fumosus* (p. 258), *M. dubius veracruensis* (p. 259), *Dryobates villosus intermedius* (p. 259), *Nyctibius jamaicensis mexicanus* (p. 260), *Antrostomus oaxaca* (p. 260), *A. chiapensis* (p. 261), *Cypselus brunneitorques griseifrons* (p. 262), *Thalassidroma ridgwayi* (p. 262), *Empidonax timidus* (p. 263), *E. baileyi perplexus* (p. 263), *Myiophobus placens julisensis* (p. 264), *Sittosomus sylvioides julisensis* (p. 264), *Dendroornis flavigaster megarhynchus* (p. 265), *Xanthocephalus lucens speciosus* (p. 265), *Calliothraux arcus assimilis* (p. 266), *Sturnella magna alticola* (p. 266), *Quiscalus macronus obscurus* (p. 267), *Amphispiza bilineata pacifica* (p. 267), *Vireo perquisitor* (p. 267), *V. amaronodius strenuus* (p. 268), *Basilicerus belli scitulus* (p. 268), *Geothlypis trichas modestus* (p. 269), *Thryothorus felix grandis* (p. 269), and *Harporhynchus curvirostris maculatus* (p. 269).

——— Descriptions of five new birds from Mexico.

Auk, XVIII, Jan., 1901, pp. 46-49.

Five species of birds are described as new, viz: *Glaucoedidium palmarum* (p. 46), *Colinus minor* (p. 47), *Empidonax tetricus* (p. 47), *Phainopepla nitens* (p. 48), and *Helodytes zonatus restrictus* (p. 49).

NELSON, ELLAS. A revision of certain species of plants of the genus *Antennaria*.

Proc. U. S. Nat. Mus., XXIII, No. 1230, June 4, 1901, pp. 697-713.

NORTON, ARTHUR H. Birds of the Bowdoin College expedition to Labrador in 1891.

Proc. Portland Soc. Nat. Hist., II, May 20, 1901, pp. 139-158, pl. II.

An account of 36 species, in some cases with extended critical notes. *Fratercula glacialis naumanni* is a new name for the Puffin inhabiting Spitzbergen. The Labrador Spruce Grouse is found to be the true *Canachites canadensis*, and *C. canadensis canace* (Linn.) is determined to be the proper name for the Canada Grouse.

NUTTING, CHARLES CLEVELAND. Smithsonian Institution. | United States National Museum. | — | Special Bulletin. | — | American Hydroids. | — | Part I. | The Plumularidae, | with thirty-four plates. | By | Charles Cleveland Nutting, | Professor of Zoology, University of Iowa. | — | Washington: | Government Printing Office. | 1900.

Spec. Bull. U. S. Nat. Mus., No. 4, Oct. 5, 1900, pp. 1-285, text figs. 1-124.

A monograph, with the following divisions: 1. Morphology of the Plumularidae. 2. Systematic discussion. Twenty-two genera and 121 species, many of which are new, are described and figured. Analytical keys of the genera and species are given.

OSGOOD, WILFRED H. New subspecies of North American birds.

Auk, XVIII, Apr., 1901, pp. 179-185.

Lagopus leucurus alpestris (p. 180), *Anorthura himalishelleri* (p. 181), *Certhia familiaris zelotes* (p. 182), and *Hylocichla ustulata schaefferi* (p. 183) are described as new.

PALMER, WILLIAM. Ecology of the Maryland Yellow-throat and its relatives.

Auk, XVII, July, 1900, pp. 216-242.

An account of the variations of the Maryland Yellow-throat and some of its relatives, together with a discussion of the moults, changes of plumages, migrations, etc.

PERGANDE, THEODORE. Papers from the Harriman Alaska expedition. XVI. Entomological results (10): The Aphididae.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 513-517.

A list of four species, three of which are new.

PERGANDE, THEODORE. Papers from the Harriman Alaska expedition. xvii. Entomological results (11): The Formicidae.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 519-521.

A list of five species, subspecies, and varieties, of which one subspecies and two varieties are described as new.

POLLARD, CHARLES LOUIS. A new *Helianthus* from Florida.

Proc. Biol. Soc. Wash., XIII, Nov. 30, 1900, p. 184.

Describes *H. agrestis*, n. sp., the type of which is preserved in the U. S. National Herbarium.

— The families of flowering plants.

Plant World, Supplement, 1900-1901, pp. 45-132.

A monthly series of popular articles on the plant families, based partly on observations made in the National Herbarium. (Continued from the previous year.)

RATHBUN, MARY J. Synopses of North American invertebrates. xi. The Catometopous or Grapsoïd crabs of North America.

Am. Naturalist, XXXIV, No. 403, July, 1900, pp. 583-592, text figs. 1-15.

Three new species are diagnosed: *Uca spinicarpa*, *Pinnixa cristata*, *Raphonotus lowei*, and *Echinophilus mellite*.

— Results of the Branner-Agassiz expedition to Brazil. i. The Decapod and Stomatopod Crustacea.

Proc. Wash. Acad. Sci., II, Aug. 20, 1900, pp. 133-156, pl. viii.

Seventy species are noticed. These were collected by Dr. J. C. Branner and Mr. Arthur W. Greeley during an expedition to Brazil for the purpose of studying the stone and coral reefs between Cape St. Roque and Rio de Janeiro. Six new species are described and the range of many others is extended.

RATHBUN, RICHARD. Report upon the condition and progress of the U. S. National Museum during the year ending June 30, 1899.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1899 (1901), pp. 1-152.

RICHARDSON, HARRIET. Results of the Branner-Agassiz expedition to Brazil. II. The Isopod Crustacea.

Proc. Wash. Acad. Sci., II, Aug. 20, 1900, pp. 157-159, text figs. 1-4.

Two species are noticed, *Corallana acuticauda* Miers, the male of which is here

RICHARDSON, HARRIET—Continued.

described for the first time, and *Bopyrus alphi*, a new species parasitic in the branchial cavity of *Alpheus heterochaelis* Say.

— Key to the Isopods of the Atlantic coast of North America, with descriptions of new and little known species.

Proc. U. S. Nat. Mus., XXIII, No. 1222, Feb. 28, 1901, pp. 493-579, text figs. 1-34.

Includes keys to families, genera, and species. A new genus, *Synuropus*, and fourteen new species are described. *Erichsonella* Benedict, *nom. nov.*, is substituted for *Erichsonia*, preoccupied.

RICHMOND, CHARLES W. On the generic name of the Californian condor.

Condor, III, Mar.-Apr., 1901, p. 49.

Gymnogyps is shown to be the proper generic name for the Californian condor.

— On the name *Vespertilio blossevillii*.

Proc. Biol. Soc. Wash., XIV, Apr. 2, 1901, p. 24.

A note showing that *Vespertilio blossevillii*, and not *V. bonariensis*, should be employed as the name of this South American bat.

— New name for *Nyctala*.

Auk, XVIII, Apr., 1901, p. 193.

Cryptoglaux is proposed in place of *Nyctala*, preoccupied.

RIDGWAY, ROBERT. New birds of the families Tanagridæ and Icteridæ.

Proc. Wash. Acad. Sci., III, Apr. 15, 1901, pp. 149-155.

The following genera and species are described as new: *Calospiza florida arexii* (p. 149), *Piranga rosco-gularis cozumelæ* (p. 149), *Rhamphocelus dimidiatus isthmicus* (p. 150), *Phainicotherapsis salvini peninsularis* (p. 150), *P. salvini discolor* (p. 150), *Chlorospingus sumichrasti* (p. 150), *Iridophanes* (type: *Dacnis pulcherrima* Selater), (p. 150), *Zarhynchus wagleri mericanus* (p. 151), *Holotuscelus martinicensis* (p. 151), *Scaphidurus major ulsoni* (p. 151), *Icterus cucullatus scannethi* (p. 152), *Icterus gularis tumantipensis* (p. 152), *Icterus mesomelas tacanowskii* (p. 153), *Agelaius phoeniceus fortis* (p. 153), *A. p. neutralis* (p. 153), *A. p. curvirostris* (p. 153), *Pseudagelaius* (type: *Agelaius inthurni* Selater), (p. 155), and *Xanthopsar* (type: *Oriolus flavus* Gmelin), (p. 155).

ROSE, JOSEPH NELSON, and COULTER, JOHN M. Monograph of the North American Umbelliferae.

Contrib. U. S. Nat. Herbarium, VII, No. 1, 1900, pp. 1-256.

SCHUCHERT, CHARLES. On the Helderbergian fossils near Montreal, Canada.

Am. Geologist, XXVII, Apr., 1901, pp. 245-253
4 figs.

Here is given a corrected list of the fossils found on St. Helens Island, showing that two distinct faunas occur there, one, the Helderbergian, older than the agglomerate, and another, from a block in the agglomerate, of Middle Devonian age. The Helderbergian fauna is not mixed up with Silurian nor Middle Devonian fossils, as described by previous students.

SCHWARZ, EUGENE A. Papers from the Harriman Alaska expedition. XVIII. Entomological results (12): Coleoptera.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 523-537.

One hundred and fifty-five species are listed, one of which, *Nebria kincaidii*, is described as new.

—— Papers from the Harriman Alaska expedition. XIX. Entomological results (13): Psyllidae.

Proc. Wash. Acad. Sci., II, Dec. 20, 1900, pp. 539, 540.

A list of 3 species, referred to their genera, but unnamed and undescribed. One of these is supposed to be new.

—— On the insect fauna of the mistletoe.

Proc. Ent. Soc. Wash., IV, No. 4, May 3, 1901, pp. 392-394.

An enumeration of the insects observed to live in or on *Phoradendron macrophyllum* in Arizona.

SIMPSON, CHARLES TORREY. On the evidence of the Unionidae regarding the former courses of the Tennessee and other Southern rivers.

Science (new series), XII, July 27, 1900, pp. 133-136, 1 map.

Introductory remarks on the relation of Biology to Physiography, by C. W. Hayes and Mr. R. Campbell, are included in this paper.

The conclusion is reached from the evidence of the Unionidae that the Tennessee River formerly flowed into the Coosa River and into the Gulf of Mexico through the Alabama system. Many of the species which are abundant in the Tennessee system and that do not occur in the Lower Mississippi are found slightly changed in the Alabama and its tributaries. A large number of species of the genus *Pleurobema* of the Tennessee drainage are closely related to those of the Alabama drainage. There is also evidence, from the present distribution, of the Unionidae, point-

ing to a former connection between the Etowah, the Chattahoochee, and the Savannah, or other nearby streams which empty into the Atlantic.

—— Synopsis of the Naiades, or Pearly fresh-water mussels.

Proc. U. S. Nat. Mus., XXII, No. 1205, Oct. 8, 1900, pp. 501-1044.

The classification is founded on the characters of the soft parts, more especially of the Marsupium, and of minor shell characters which are correlated with the animal. A full synonymy and bibliography are given.

—— *Alasmidonta marginata* Say.

Nautilus, XV, June, 1901, pp. 16, 17.

Notes on 2 forms of *Alasmidonta*, in which an attempt is made to determine which is the true *A. marginata* of Say.

SMITH, JOHN B. A hundred new moths of the family Noctuidæ.

Proc. U. S. Nat. Mus., XXIII, No. 1263, July 11, 1900, pp. 413-495.

Descriptions of 100 new species, most of which are in the collection of the U. S. National Museum.

—— Contribution toward a monograph of the North American Noctuidæ. Revision of the species of *Xylina* Ochs.

Trans. Am. Ent. Soc., XXVII, No. 1, Aug., 1900, pp. 1-46, pls. 1-V, 72 figs.

Thirty-four species are included, of which number six are described for the first time. Two of the plates are taken up with figures of the genitalia, while the other three give photographic reproductions of the moths themselves. Based partly on Museum material.

—— Contributions toward a monograph of the Noctuidæ of Boreal North America. Revision of the species of *Acontia* Ochs.

Trans. Am. Ent. Soc., XXVII, No. 1, Sept., 1900, pp. 47-84.

Two species of *Tornacontia*, two of *Conacontia* and thirty-two of *Acontia* are included. Of these one species of *Tornacontia*, one of *Conacontia*, and twelve of *Acontia* are described as new. Based partly on Museum material.

STARKS, EDWIN CHAPIN. (See under DAVID STARR JORDAN.)

STEELE, E. S. Sixth list of additions to the flora of Washington, D. C., and vicinity.

Proc. Biol. Soc. Wash., XIV, June 19, 1901, pp. 47-86.

This paper records a number of additions to the District flora. The author describes

STEELE, E. S.—Continued.

Lycepus sherardi, n. sp.; Prof. E. L. Greene describes *Viola latecarulea*, n. sp., and Mr. Alvah A. Eaton *Isoetes saccharata palmeri*, n. var. and *Isoetes saccharata reticulata*, n. var. The collections on which the paper is based are deposited in the National Herbarium.

STEJNEGER, LEONHARD. On a new species of Spiny-tailed iguana from Utila Island, Honduras.

Proc. U. S. Nat. Mus., XXIII, No. 1217, Jan. 19, 1901, pp. 467, 468.

Ctenosaura bakeri described as a new species; type, Cat. No. 26317, U. S. N. M.

——— A new systematic name for the Yellow boa of Jamaica.

Proc. U. S. Nat. Mus., XXIII, No. 1218, Jan. 19, 1901, pp. 469, 470.

Epicrateris subflavus described as a new species; type, Cat. No. 14507, U. S. N. M.

——— Diagnosis of a new species of iguanoid lizard from Green Cay, Bahama Islands.

Proc. U. S. Nat. Mus., XXIII, No. 1219, Jan. 19, 1901, p. 471.

Leiocephalus vivescens described as a new species; type, Cat. No. 26758, U. S. N. M.

——— On the Wheatears (*Saricola*) occurring in North America.

Proc. U. S. Nat. Mus., XXIII, No. 1220, Feb. 25, 1901, pp. 473–481.

A study of the Wheatears occurring in North America, in which it is shown that a form hitherto overlooked occurs in Greenland; this is recognized as *Saricola ananthe leucorhoa* (Gmelin). A full-synonymy of both forms is given, together with an extended table of measurements.

——— [Review of] Scharff's History of the European Fauna.

Am. Naturalist, XXXV, Feb., 1901, pp. 87–116.

A critical review of Dr. Scharff's book, in which the writer maintains, in contradistinction to Scharff, the Arctic character of the climate of Europe during the Glacial epoch. He disagrees with him in assigning an American origin to the animals constituting Scharff's "Arctic Migration" and suggests that they form a preglacial "first Siberian Invasion."

——— Crocodilian nomenclature.

Science (new series), XIII, No. 323, March 8, 1901, p. 394.

Contends for *Jacaretinga crocodilus* (Linn.) as the correct name for *Caiman seticeps*, and *Crocodylus niloticus* for the Nile crocodile, against Mr. W. J. Fox in *Science*, Feb. 8, 1901, p. 232.

STEJNEGER, LEONHARD. The two races of *Saricola ananthe*.

Auk, XVIII, April, 1901, pp. 186, 187.

Some additional notes on the two forms of Wheatears inhabiting the Western Hemisphere, with measurements of some migrants from east and west Africa.

——— Corrections to Eckel's "The Snakes of New York State."

Am. Naturalist, XXXV, May, 1901, p. 428.

Shows that *Oscrota clerica* and *Natrix erythrogaster* have been erroneously attributed to the State of New York.

——— Description of a new species of snake from Clarion Island, west coast of Mexico.

Proc. U. S. Nat. Mus., XXIII, No. 1231, June 5, 1901, pp. 715–717.

Bascanion anthonyi described as a new species; type, Cat. No. 24390, U. S. N. M.

——— Description of two new lizards of the genus *Anolis* from Cocos and Malpelo islands.

Bull. Mus. Comp. Zool. Harv. Coll., XXXVI, No. 6, pp. 161–164, 1 pl.

Anolis agassizi described as a new species on p. 161 and figured on plate; type, Cat. No. 22101, U. S. N. M. *Anolis townsendi*, n. sp., p. 263; type, Cat. No. 22107, U. S. N. M.

STOKES, H. N. (See under George P. Merrill.)

STRONG, R. M. A quantitative study of variation in the smaller North American shrikes.

Am. Naturalist, XXXV, April, 1901, pp. 271–298, 8 text figs.

In this paper the precise criterion of species introduced by Davenport is applied to the shrikes of the *Lanius ludovicianus* group. A detailed account of the methods employed is given.

VAUGHAN, T. WAYLAND. *Trochocyathus woolmani*, a new coral from the Cretaceous of New Jersey.

Proc. Acad. Nat. Sci. Phila., 1900, pp. 436, 437, 3 figs.

——— The Eocene and Lower Oligocene coral faunas of the United States.

Monogr. U. S. Geol. Surv., XXIX, 1900, pp. 5–263, pls. 1–24.

——— A Tertiary coral reef near Bainbridge, Georgia.

Science (new series), XII, 1900, pp. 873–875.

VAUGHAN, T. WAYLAND. The locality of the type of *Prionastraea vaughani* Gregory.

Ann. & Mag. Nat. Hist. (series 7), VII, No. 39, Mar., 1901, p. 300.

— Corals from the Eocene of Maryland and Virginia.

Maryland Geol. Surv., Eocene. Baltimore, Johns Hopkins Press, 1901, pp. 222-232, pl. LXI.

— Shell Bluff, Georgia, one of Lyell's original localities.

Science (new series), XIII, 1901, p. 270.

— Some fossil corals from the elevated reefs of Curaçao, Arube, and Bonaire.

A paper published by the Rijks Geologisch Museum, Leiden, ser. II, Bd. II, Heft 1, pp. 1-91.

VERRILL, A. E. Additions to the Crustacea and Pycnogonida of the Bermudas.

Trans. Conn. Acad. Arts and Sci., x, pt. 2, No. XV, Sept., 1900, pp. 573-582, pl. LXX, figs. 9, 10, text figs. 2-4.

About 20 species of Crustacea are added to list of those known from the Bermudas. The determinations were made in part by Miss Rathbun.

WALCOTT, CHARLES D. Report upon the condition and progress of the U. S. National Museum during the year ending June 30, 1898.

Rep. Smithsonian Inst. (U. S. Nat. Mus.), 1898 (1900), pp. 1-119.

— Cambrian brachiopoda: *Obolella*, subgenus *Glyptias*; *Bicia*; *Obolus*, subgenus *Westonia*; with descriptions of new species.

Proc. U. S. Nat. Mus., XXIII, No. 1229, May 22, 1901, pp. 669-695.

The author here continues his studies of the Cambrian brachiopods and defines the genus *Obolella* and the new subgenus *Glyptias* with 3 species; also the genus *Bicia* and 2 species. Further notes are made on *Obolus* and its 8 subgenera, of which one, *Westonia*, is new. Ten new species of *Obolus* are defined.

WANNER, ATREUS. (See under Lester F. Ward.)

WARD, LESTER F. (with W. M. Fontaine, Atreus Wanner, and F. H. Knowlton). Status of the Mesozoic floras of the United States. First paper—The Older Mesozoic.

20th Ann. Rep. U. S. Geol. Surv., 1898-99, II, 1900, pp. 211-748, pls. XXI-CLXXIX.

This paper is based largely on specimens in the Museum collections, and is the first of a series of papers to be devoted to a comprehensive statement of the progress of the development of the Mesozoic floras of the United States.

The paper gives an historical account of the work thus far done on the Triassic and Jurassic floras of the United States, and also includes many new descriptions, nearly 200 species or separate forms being described. Prof. Atreus Wanner describes a new Triassic flora from material collected by himself in York County, Pa., which is also figured by himself. Professor Fontaine redescribes the Emmons collection made 50 years ago in the Trias of North Carolina. The whereabouts of this collection was unknown for many years. He also describes and illustrates the Jurassic flora of Oroville, Cal. Professor Ward describes and illustrates 20 species of *Cycadella* from 83 Jurassic cycadean trunks from Carbon County, Wyo., and Professor Knowlton describes fossil wood from the Trias of North Carolina and the Jurassic of the Black Hills of Wyoming, and the Freezeout Hills of Carbon County, in the same State. A new genus of Jurassic conifers from South Dakota is described as *Pinogylon*. Professor Ward gives a brief notice of the Triassic flora of Virginia and points out its agreement with the Triassic flora of Lunz in Austria, referred by Stur to the Keuper.

WHITE, DAVID. The stratigraphic succession of the fossil floras of the Pottsville formation in the southern anthracite coal field, Pennsylvania.

20th Ann. Rep. U. S. Geol. Surv., 1898-99, pt. II, 1900, pp. 749-930, pls. CLXXX-CXCHL.

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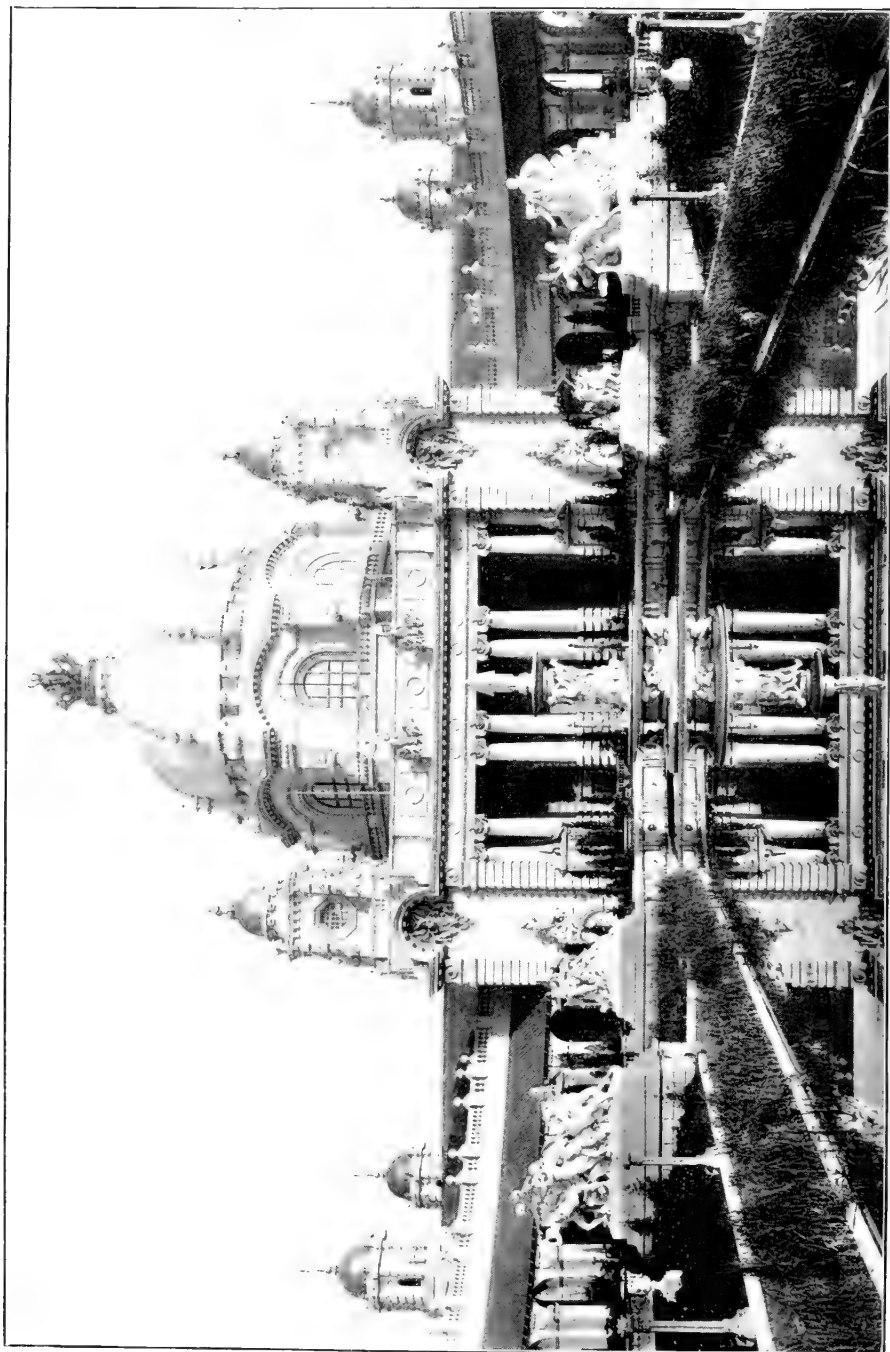
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FRONT VIEW OF GOVERNMENT BUILDING, PAN-AMERICAN EXPOSITION.

REPORT
ON THE
EXHIBIT OF THE UNITED STATES NATIONAL MUSEUM
AT THE
PAN-AMERICAN EXPOSITION, BUFFALO, NEW YORK, 1901.

BY
FREDERICK W. TRUE,
Representative, Smithsonian Institution and National Museum.

WILLIAM H. HOLMES,
Head Curator, Department of Anthropology,

AND
GEORGE P. MERRILL,
Head Curator, Department of Geology.

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REPORT ON THE EXHIBIT OF THE UNITED STATES NATIONAL MUSEUM AT THE PAN-AMERICAN EXPOSITION, BUFFALO, NEW YORK, 1901.

By FREDERICK W. TRUE, WILLIAM H. HOLMES, AND GEORGE P. MERRILL.

SUMMARY.

By FREDERICK W. TRUE,
Representative, Smithsonian Institution and National Museum.

The Pan-American Exposition held at Buffalo, New York, opened May 1, 1901, and closed November 2, 1901. An exhibit from the Smithsonian Institution and National Museum was provided for in the act of Congress approved March 3, 1899. The total amount appropriated for the Government exhibit was \$300,000, and for a Government building, \$200,000. Of the former amount the Smithsonian Institution and National Museum were allotted \$50,000, in addition to which \$2,500 was transferred from the allotment of the Interior Department to allow for the construction of a model of the extinct American reptile *Triceratops*, to be jointly exhibited by the National Museum and the Geological Survey. The total amount allotted was considerably below the estimate submitted to the board, which was \$62,625.

On the gross sum originally available a pro rata assessment to provide for an exhibit from the outlying possessions of the United States, amounting to \$1,960.79, was made by the board, and \$200 were transferred to the allotment of the War Department. The net Smithsonian allotment was, therefore, \$50,339.21.

The Government building (Plate 1) at Buffalo was on the west side of the exposition grounds. It was oblong in shape and had a length of 418 feet and a breadth of 140 feet and was surmounted by a dome 235 feet high. Two pavilions were connected with the main building on the east side by colonnades. The north pavilion was occupied by the Fish Commission and the south pavilion conjointly by the Department of Agriculture and the Philippine collection. The exterior of the building was finished in stucco and tinted yellow, except the dome, which

was blue. The elaborate polychrome decoration of the other exposition buildings was not attempted.

The space in the Government building allotted to the Smithsonian Institution and National Museum was in the northwestern corner. (Plate 2.) It originally amounted to 10,108 square feet, but the size of the Government building being subsequently reduced the space was contracted. From the extreme north and south ends and from the west wall to the main aisle it measured 133 feet by 56 feet, comprising an area of about 7,500 square feet. A small area at the north end was separated from the main space by a cross aisle 8 feet wide, leading to one of the west entrances, and a similar aisle crossed the space near the south end, though this was not originally proposed, but was found necessary to allow convenient admission from the annexes. The subdivision of the space and the arrangement of cases are shown in the accompanying diagram. (Plate 3.)

The space was on the whole well lighted by a series of large windows in the west wall, supplemented by the clearstory windows above the main aisle. The west windows were stippled with white paint to obstruct the direct rays of the sun, and a series of transparencies were placed in front of them as embellishments.

As usual in most exposition buildings, the posts supporting the clearstory and aisles caused more or less inconvenience in locating the cases. In one instance it proved unavoidable to cut a standard case in pieces and rebuild it about a post in order to maintain an important aisle. In other instances posts stood immediately in front of the cases, producing a most undesirable effect. These architectural inconveniences can only be got rid of by supporting the roof by a series of arches springing from the walls.

The interior decoration of the building, as a whole, was placed in the hands of a committee of the Government board and was uniform throughout, consisting of red and green bunting supplemented by United States flags. To these, in the Museum space, were added large signs bearing the name of the Institution and Museum and a trophy, or coat of arms, with the seal and motto of the Smithsonian Institution.

The building had no basements, and empty packing cases were stored in lofts in the various towers and in the parapets constructed by the War Department to illustrate the mounting of large ordnance.

A good deal of inconvenience was experienced at the beginning by the defects in the roof of the building, on account of which certain parts of the space were flooded during heavy rains. By constant watchfulness, however, serious damage was avoided. The weather conditions immediately prior to the opening of the Exposition were extremely unfavorable. The workmen suffered much from cold, and the receipt and unloading of exhibits were greatly hampered. Nevertheless, by hard work the Museum display was opened to the public

and practically complete on the 1st of May, when many other parts of the Exposition were in a backward condition.

As in the case of previous expositions, the exhibit of the National Museum far exceeded that of the other bureaus under the direction of the Smithsonian Institution and of the Institution itself, and the greater part of the total sum allotted was expended in its preparation. The reason of this will be readily understood when it is recalled that the Museum is continuously engaged in preparing permanent exhibits for the public, and has greater responsibilities in this direction than any other bureau of the Government. The proportion of the allotment expended by the Museum can not be exactly stated, because the same mechanics and preparators who were employed in connection with its exhibits were also engaged for some time on the work of the other bureaus of the Institution. No apportionment among the several bureaus of the sum set aside by the Government board was necessary or desirable, and none was made.

The Bureau of American Ethnology made no separate exhibit on this occasion, those features of its work which lend themselves to exhibition being shown through the agency of the Department of Anthropology in the Museum.

As in previous instances, the permanent collections, cases, and fixtures of the Museum were drawn upon as far as circumstances would permit, but some new cases were found indispensable, and numerous specimens were purchased to fill out the various series which it was finally determined to exhibit at Buffalo.

The temporary cases constructed for the Exposition were of pine, painted black, and furnished with plate glass. These comprised group cases for the Department of Anthropology and wall cases and one or two special cases for the Departments of Biology and Geology. The regular mahogany Museum cases used were of the styles known as "reconstructed door screens" and "slope tops."

As may be surmised, the regular staff of the Museum can not be drawn upon beyond a certain limit to prepare collections for a temporary exposition. The regular work of the Museum goes on hand in hand with the special exposition work, and the principal officers of the Museum devote a share of their time to each, but it is necessary to augment the staff of preparators, taxidermists, etc., very considerably or the exposition collections could never be got ready on time. This necessity causes one of the principal difficulties in preparing for an exposition, as expert preparators are few, and those whose services are desirable are not always to be had at a specified time. The Museum was especially fortunate in this matter in connection with the Pan-American Exposition, and it is not too much to say that the work turned out both by the regular and temporary preparators was superior as a whole to any previous effort. The temporary preparators

consisted of sculptors, model makers, taxidermists, colorists, paleontological preparators, modelers, and preparators of "accessories," such as artificial leaves, flowers, etc.

On June 23, 1899, Mr. W. V. Cox, chief clerk of the National Museum, was designated chief special agent, Smithsonian Institution and National Museum, for the Pan-American Exposition. Mr. Cox was also elected secretary of the Government board June 13, 1899, and with the consent of the Secretary of the Smithsonian Institution served in this capacity throughout the Exposition.

The work of preparing the exhibits was begun in July, 1899, at which time a building on Tenth street S.W., Washington, was leased for temporary workshops. Another workshop and warehouse, No. 414 Tenth street N.W., was occupied from August, 1900, to April, 1901, by the Museum conjointly with several of the Executive Departments.

One of the first operations engaged in was the overhauling of the collections stored in the Museum annexes for material suitable for the Exposition. This involved considerable time and expense on account of the crowded condition of the storage quarters.

A considerable amount of field work was done in connection with the exhibits. Drs. Stejneger and Richmond visited Porto Rico, and Messrs. William Palmer and J. H. Riley explored western Cuba in February, 1900, and succeeding months in search of characteristic birds, reptiles, and batrachians. By the courtesy of the War Department the collectors were sent to their respective destinations on the transports *McPherson* and *Sedgwick*, and the collections made in Cuba were also transported to the United States through the Quartermaster's Department of the Army. Drs. Stejneger and Richmond returned April 29, 1900, and Messrs. Palmer and Riley August 14, 1900. Mr. Wirt Tassin visited Philadelphia in July, 1899, to examine collections of minerals, and a number of purchases were made. Mr. F. A. Lucas visited the vicinity of Plattekill, New York, in August, 1899, for the purpose of examining a mastodon skeleton of which some information had been received. The specimen did not, however, prove suitable for the exhibit. Another endeavor was made in the autumn of 1899 to obtain a mastodon skeleton by excavating near Monroe, New York, but this also proved unsuccessful. The same was the case with investigations in Arkansas, Oklahoma, and Indian Territory in October, 1900. Mr. Lucas went to Kiminswick, Missouri, in August, 1900, on the same mission, but without result. Dr. G. P. Merrill superintended the sawing of some fine specimens of orbicular granite in Baltimore in October, 1899. Dr. Merrill also visited several localities in North Carolina in November, 1899, and New Haven, Connecticut, Chester, Massachusetts, in March, 1901, and New York City in January, 1900, for the purpose of obtaining geological specimens. Mr. W. H. Newhall visited Point of Rocks, Maryland, for the purpose of obtaining

specimens of the conglomerate rock of that locality. Mr. Adolph Tuchband, who made an expedition to the Upper Amazon River in the spring of 1900, undertook to obtain ethnological objects, models, costumes, utensils, etc., of the Indian tribes of that region. The Museum, however, received nothing from this source.

Mr. W J McGee, ethnologist in charge, Bureau of American Ethnology, was granted a small sum to collect objects illustrating the ethnology of the Tepoka Indians of Mexico. On visiting their country, however, he found the tribe practically exterminated, and he turned his attention to the Cocopa Indians, from whom he obtained a valuable collection.

Additions to the various series which it was decided to exhibit were also made by purchase from professional collectors and dealers both in the United States and Europe.

Prof. J. B. Steere spent two months on the Amazon River in obtaining characteristic fishes and other vertebrates of that part of South America and objects illustrating the ethnology of the various Indian tribes. Messrs. Barton A. Bean and W. H. King were detailed to go to Key West, Florida, to collect fishes in formalin, for a special exhibit, to which further reference will be found on page 186.

THE EXHIBIT OF THE DEPARTMENT OF BIOLOGY.

By FREDERICK W. TRUE,
Head Curator.

In planning an exhibit from the Department of Biology many points have to be taken into consideration, such as the letter and spirit of the law providing for a Government exhibit; the purpose of the exposition as a whole; the conditions existing as regards obtaining specimens suitable for exhibition; the relative significance and attractiveness of different exhibits to the general public.

In the case of the Pan-American Exposition the underlying idea was so clearly defined that no difficulty was experienced in determining the proper scope of the exhibit. The Exposition, as its name implies, was intended to represent America as a whole. It was fitting, therefore, that the animals and plants of North, South, and Central America should be represented, while a representation of the fauna and flora of the rest of the world could with propriety be omitted.

The exhibit of the Department was thus limited and only American objects were represented. From experience gained by participation in other expositions it was felt that, generally speaking, large objects would be more suitable and better appreciated than small ones, and it was decided, therefore, to confine the zoological exhibit to the vertebrates. There is no question that a representation of the invertebrate

fauna of America would have proved interesting to the public, especially such classes of animals as the insects, corals, mollusks, etc., but in proportion to the outlay of time involved in the preparation of a thoroughly attractive exhibit the vertebrates appeared to offer the best topic. A display of the flora of America was necessarily omitted because the Museum is without resources in this direction, its botanical collection consisting entirely of dried plants and specimens in alcohol, which are unsuitable for a popular exhibit. To obtain a creditable botanical exhibit by field work was impossible in the time allotted.

In order to make the exhibit of the vertebrate animals of America as significant and attractive as possible the best specimens in every class were withdrawn from the exhibition series of the Museum, and these were supplemented by specimens purchased wherever obtainable. In addition four field parties were sent out to gather material not otherwise available. Dr. L. Stejneger, curator of the Division of Reptiles, and Dr. C. W. Richmond, assistant curator of the Division of Birds, were sent to Porto Rico and the other West Indian Islands; Mr. William Palmer, chief taxidermist, and Mr. J. H. Riley, aid in the Section of Birds' Eggs, were sent to Cuba; Mr. B. A. Bean, assistant curator, Division of Fishes, and Mr. King, to Key West, Florida, while Prof. J. B. Steere undertook to obtain fishes and other vertebrates from the Amazon River.

Drs. Stejneger and Richmond did excellent work in Porto Rico, obtaining a large collection of birds and reptiles, but were prevented by sickness and the uncertainties of transportation from visiting other West Indian Islands, as was originally intended. The operations of Messrs. Palmer and Riley were confined to western Cuba, where large collections of birds, reptiles, and mammals were made, but the collectors were prevented by lack of time from visiting the eastern end of the island.

In order to accomplish anything of importance it was necessary to send these parties out early, while the general plans of the Government board as regards buildings, allotment of space, and exhibits from the outlying possessions of the United States were still incomplete. The original plans were considerably modified before being adopted, the total amount of space in the Government building was reduced, and endeavors to form general exhibits from Cuba and Porto Rico under the Government board were abandoned on account of the action of the governors of these islands in providing separate displays. It resulted that only a portion of the material collected could be exhibited, and this was incorporated with the general Museum exhibits.

The work of Professor Steere on the Amazon resulted in our obtaining an excellent series of characteristic fresh-water fishes of this region, together with characteristic tortoises and other reptiles.

In addition to the material obtained by these collecting parties the

Museum secured many fine, characteristic North American mammals, birds, and reptiles through its correspondents and through various dealers in natural-history material.

When completed the exhibit contained a very full outline series of the vertebrate animals of North America and a smaller but still significant series from South and Central America. (Plate 4.) Among the mammals were such striking forms as the Kadiak bear, glacier bear, Alaska moose, Dall's white sheep, Stone's sheep, musk ox; such birds as the condor, California vulture, rhea or American ostrich, wild turkey, harpy eagle, various gay-colored toucans, the ara, Carolina parakeet, whooping crane, steamer duck, penguin (Plate 12), etc., together with rattlesnakes, boas, Gila monster, alligator snapper, matamoras, mud eel, Cuban toad, and other characteristic American reptiles and batrachians, and a large series of useful, curious, and brilliantly colored American fishes. A more detailed account of the principal features of the exhibit will be found on a later page.

TAXIDERMY.

In connection with the Buffalo exhibit a system of accessories was adopted which, so far as I am aware, has not been attempted hitherto on a large scale. It was impracticable on account of limited space to exhibit groups showing the habits and natural surroundings of various species, while to display the specimens on plain wooden stands was thought to deprive them to a certain extent of attractiveness. A compromise was therefore effected by using small stands and suggesting the environment by the introduction of a few plants, a rock or two, a little snow, a branch of a tree, etc. Thus, the Kadiak bear was placed on a stand having on it a small section of rock, a little sloping area of sand, and a dead salmon. The fish-eating habit of this Alaskan bear was thus suggested in a very small space. The indigo snake was mounted on a base covered with sand, with a pine cone or two and a bit of palmetto to indicate that it is a denizen of the pine barrens. The condor was represented as perched on a pointed rock, suggesting its mountain habitat. This treatment was not adopted for fishes, as any endeavor to represent their environment would have caused a greater expenditure of time and money than the circumstances permitted. They were represented for the most part by painted plaster casts drawn from the Museum exhibition series. These were supplemented by the Key West collection, and by Professor Steere's collection from the Amazon River, preserved in formalin. The manner in which these two series of fishes were prepared presented some novel features and is deserving of a short explanation.

The collectors were provided with a number of shallow galvanized-iron pans, having a uniform length of 2 feet, a quantity of formalin, injecting syringes, etc. The fish were injected as soon as obtained

and placed in pans, with the fins carefully spread out in natural positions. A dilute solution of formalin was then poured into the pans and allowed to remain until the specimens hardened properly. They were then taken out and wrapped in cloth and packed with great care.

In the meantime a series of 80 square glass jars, each 2 feet long and 1 foot high, were purchased in Germany, and an equal number of plaster of paris plaques provided, 1 inch thick and exactly long and high enough to fit the jars. As soon as the fish and jars reached Buffalo the fish were attached to the plaques and placed in the jars and dilute formalin poured in. With one or two exceptions the specimens remained in excellent condition throughout the exposition. (See Plate 21.) The form of the body and fins was exactly preserved, and the color remained sufficiently to give a very good idea of the appearance of the fish when alive, though the brighter tints of many of the species were in most cases subdued or lost. No method of preserving the life colors perfectly is yet known. To a large extent they appear to be physiological phenomena. The experiment, as a whole, may be considered very successful. At the end of six months' exposure at Buffalo the collection was apparently in as good condition as at the beginning, and was transferred to the Charleston Exposition without any further preparation.

CASES AND INSTALLATION.

On account of the large size of some of the mammals, the exhibit of the Department of Biology occupied the center of the space allotted to the Museum. Two wall cases 40 feet long, 10 feet high, and 4 feet deep were constructed for the mammals at right angles with the main aisle (Plate 5), and flanking them along the west wall was a similar but shallower case for the fishes.

The birds occupied eight standard Museum screen cases, 8 feet 6 inches long, in front of the mammal cases, and in front of these were four standard Museum slope-top cases, 8 feet 6 inches long, for the reptiles and batrachians. A special case was occupied by the humming birds.

On account of the small space available, no attempt was made to assemble the different species in faunal groups, an arrangement which under proper conditions would have been very desirable. In temporary expositions the refinements of classification adopted in museums can seldom be carried out. The Government building at such expositions is generally constructed on broad architectural lines to accommodate the diverse exhibits of the several executive departments and bureaus. The lighting and interior arrangements of the portion allotted in such buildings to the National Museum rarely

permit the carrying out of any preconceived plan rigorously. The collections are fitted to the space rather than the space to the collections. This limitation was experienced in Buffalo no less than at previous expositions. The condition, as already stated, was met by the abandonment of faunal lines and the mingling together of animals from the northern and southern parts of the American continents. The loss of faunal boundaries was probably not felt except by naturalists. The eye rested everywhere on American species and only American, and the labels indicated what particular region each animal inhabited.

All the larger mammals and all the birds, reptiles, batrachians, and fishes were furnished with descriptive labels, containing in untechnical language the most interesting facts in the natural history of the various species. The preparation of these labels involved no little labor, and amounted in effect to writing a popular treatise on the natural history of the more characteristic American vertebrates. The labels for the reptiles and batrachians were prepared by Dr. L. Stejneger, those for the birds by Dr. C. W. Richmond, for the mammals by Mr. G. S. Miller, jr., and for the fishes by Mr. B. A. Bean. Specimens of these labels are subjoined.

GLASS-SNAKE.

Ophisaurus ventralis (Linnaeus).

Although without limbs, and in spite of its name, the Glass-snake is no snake at all, but a degenerate lizard, not very distinctly related to the species with four well-developed legs. The character by which it may instantly be recognized is the external ear opening, which is absent in all snakes.

The name Glass-snake refers to the brittleness of its tail, which is so extreme that a violent muscular exertion is sufficient to disarticulate the vertebrae and break the animal in two or more pieces. It lives in holes in the ground, and when caught often saves its life by disengaging the tail, and leaving the wriggling member in the hand of the confused captor. That the separate parts of the tail are able to join each other and grow together again is, of course, a fable. On the contrary, a new, short stump grows out to replace the lost portion of the tail. This reduced portion is differently colored, and such a specimen as here exhibited is often by the ignorant regarded as evidence of the existence of the fabulous "Hoop-snake," the conical stump being taken for the alleged "sting" of the latter.

The Glass-snake is common in the southern United States.

MOUNTAIN CARIBOU.

Rangifer montanus Thompson Seton.

This is the Caribou of the Rocky Mountains of Canada, southern Alaska, and Idaho. It is much darker in color than the Caribou of the Maine woods, from which it differs also in various details of structure, though its habits are similar. The Caribous are the American representative of the reindeer, but have never been domesticated by the Indians or Eskimos; and the Government has found it necessary to introduce tame reindeer from the Old World into parts of Alaska where native Caribous are abundant.

CONDOR.

Sarcorhamphus gryphus (Linnæus).

This huge American vulture is one of the largest birds of flight and probably occupies the first place among the land birds. It ranges over a large portion of South America and is restricted mainly to the Andes, where it ascends to heights not reached by any other creature. The condor is of slow growth, requiring about seven years to attain the full plumage shown by this specimen, and the young birds occupy the nest for a year or more before they are able to fly.

MAMMALS.

The largest of the North American game animals exhibited was the Alaska moose (*Alces gigas*). This has only recently been recognized as a separate species. It grows to a larger size than the moose of the Eastern States and has larger antlers, which sometimes have a spread more than 6 feet. They do not remain in herds or "yard" in winter, like the Eastern species, and the Indians are therefore unable to surround them in bands. The fine specimen exhibited was one of a small series obtained for the Museum a few years ago by Mr. Dall De Weese. It was represented as standing at the edge of a wood among fallen branches and leaves and young spruce trees.

Another interesting Alaska game animal was Dall's sheep (*Ovis dalli*). This was also obtained in the Cooks Inlet region by Mr. De Weese. It is pure white throughout, and thus distinguished from all other wild sheep. It lives among the mountain snow fields. The species was first made known by Mr. E. W. Nelson.

In contrast with this sheep was exhibited the newly discovered black sheep, or Stone's sheep, from the northern limit of the Rocky Mountains of British America. (Plate 8.) This beautiful sheep is very dark colored with numerous black markings. It was discovered by Mr. H. A. Stone in the upper part of the Stikine Valley, British Columbia, and described by Dr. J. A. Allen.

Two other large Alaskan mammals deserve special notice. The larger of these is the Kadiak bear (*Ursus middendorffi*). This is the largest of existing bears and the largest of carnivorous animals. (Plate 7.) It far exceeds the lion in height and weight, adults probably not falling short of a ton. The specimen exhibited weighed about 1,200 pounds. This huge bear occurs, so far as known, only on Kadiak Island at the mouth of Cooks Inlet. It feeds on salmon and on grasses, berries, and other vegetable matter. The species was only recently founded by Dr. C. H. Merriam, who separated it from the grizzly bear and from other bears with long claws inhabiting the northwestern section of the continent.

The other Alaskan species above mentioned was the glacier bear (*Ursus emmonsii*). This is a small bear of the black-bear group, but, unlike its congeners, it is gray in color, a very unusual tint among

bears, and probably only found elsewhere in the bear of the mountain ranges of Tibet. (Plate 9.) Its home is among the snow fields and glaciers back of Mount St. Elias. Little is known of its habits, and but few specimens have ever reached museums. It is among the rarest of American mammals. Its existence was vaguely known to hunters and explorers for a considerable time, but the species was not established until 1895. It was described by Mr. William H. Dall and named in honor of Lieutenant Emmons, U. S. Army.

Another recently known mammal of the Northwest which was included in the exhibit was the caribou of the northern Rocky Mountains, known as the "mountain caribou." It was first made known to science in 1899 by Mr. Thompson Seton, who obtained specimens from the Selkirk Ranges, British Columbia. Like Stone's sheep, it is very dark in color—much more so than the well-known caribou of Maine.

The series of large American arctic and subarctic mammals included also the musk ox of the barren grounds of Canada, the white goat (or goat antelope) (Plate 10), and the fur seal.

As characteristic large mammals of the United States were exhibited the prong-horn (head), the puma or cougar, the gray wolf (Plate 11), Virginia deer (head), Columbia deer (head), wapiti, and bison.^a

Of Central American mammals the most interesting exhibited was the Caribbean seal (*Monachus tropicalis*). This seal was formerly very abundant in the Gulf of Mexico, but is now confined to the Gulf of Campeachy, where an excellent series was recently obtained for the Museum by Mr. E. W. Nelson. This was one of the first American animals seen by Columbus.

The South American mammals had as prominent representatives the vicuña, a relative of the well-known llama; the jaguar; the kinkajou, allied to the raccoon; the coati or coatimondi; the giant armadillo, the largest of these typical South American mammals; the coypu, one of the largest of rodent mammals; Azara's dog, one of the fox-like small wild dogs which replace the true foxes in South America; the chestnut-headed sloth; the chinchilla; the Chilean guemal, a characteristic deer of the southern Andes; the great ant-eater; the vis-eacha, a rodent not unlike the prairie dog, very abundant on the Pampas; the Patagonian cavy; the white-tipped peccary, and various monkeys, such as the tufted Capuchin monkey, mantled howler, long-haired spider monkey, etc.

A very interesting small mammal was the Cuban hutia rat. Three species of these rats are peculiar to Cuba, the indigenous mammal fauna of which consists in addition only of certain bats and an insectivore known as the almiqui (*Solenodon*). In spite of persistent efforts specimens of the last could not be obtained for the Exposition.

^aOf this only a head was exhibited. Two paintings, representing the reckless slaughter of the bison which led to its extermination, were also displayed.

BIRDS.

The collection of birds shown at Buffalo consisted of 416 specimens, representing the most striking native forms of the Western Hemisphere. It contained representatives of the largest as well as the smallest of the birds of this region. Prominent among the species of special interest was the condor (*Sarcorhamphus gryphus*) of the Andes of South America. (Plate 13.) The specimen exhibited was a male in fully adult plumage, which is attained only after the bird is 6 or 7 years old. As an example of the best style of taxidermy the specimen was not surpassed by any other in the collection. With the condor was exhibited the California vulture (*Gymnogyps californianus*), a near relative and one which rivals it in size. It was once common on the Pacific coast of the United States, but it is now confined to the less accessible mountains of California.

The harpy eagle (*Thrasaetos harpyia*), a bird of great strength and cruel aspect, living in the dense lowland forests of tropical America, was represented by a fine adult specimen. Both the golden and the bald eagles (the latter being the American "bird of freedom") were represented by well-mounted specimens. The largest bird shown was the rhea (*Rhea americana*), the New World representative of the African ostrich. It lives on the grassy plains of southern South America. The prince of American game birds, the wild turkey (*Meleagris gallopavo fero*), was shown in its characteristic attitude of strutting. In this specimen the naked parts about the head and neck were colored as in life. Elsewhere in the collection an effort was also made to render the natural colors of faded parts by painting. The necessity of so doing is strongly felt in such birds as the toucans, whose most striking characteristic is the brilliant coloration of the enormous bill. These bright tints disappear at death and in museum specimens must be reproduced by pigments. Several specimens of these toucans were exhibited, each one differing from its fellows in tints and pattern of color of its bill. Among the species shown were Cuvier's toucan (*Ramphastos cuvieri*), the Tocard toucan (*R. tocard*), the toco (*R. toco*), the red-billed toucan (*R. erythrorhynchus*), etc. Of the parrots exhibited the hawk parrot (*Deroptyus accipitrinus*) deserves special notice. It is remarkable for its tiara-like crest of bright colors, and is an uncommon species, native of the Amazon region. From the mountains of the small island of Dominica was shown the rare imperial parrot (*Amazona imperialis*), conspicuous for its unusual purple coloring. Of equal interest was the St. Vincent parrot (*Amazona guildingi*), which is noted for the yellow markings on its wings. Other noteworthy species of parrots exhibited were the grass-green paroquet of Brazil, a vivid green bird scarcely as large as a sparrow and one of the smallest members of this family; and the Carolina paroquet (*Conu-*

rus carolinensis), formerly common in many parts of the eastern half of the United States, but now restricted to parts of Florida and Arkansas.

Two of the most gorgeous species of macaws were exhibited—the blue-and-yellow macaw (*Ara ararauna*), and the red-blue-and-yellow macaw (*A. macao*). They are large birds with very long tails and richly colored, as their names indicate. Both species inhabit tropical America and are commonly kept in zoological gardens.

One of the most interesting small birds in the collection was a crowned tyrant (*Oncorhynchus regius*), a South American flycatcher, of dull coloration generally, but with a brightly colored, transverse crest of unusual size. The tyrant can erect its crest at will, but in a state of rest it is folded inconspicuously on the bird's back.

Among the most remarkable birds in the collection was the king vulture (*Gypagus papa*), native of the warmer parts of America. It is of a creamy white and black color, with a hairy, featherless head and neck, the skin of which is decorated with most of the colors of the rainbow.

The steamer duck (*Tachyeres cinerea*) of Patagonia, a large gray bird, is remarkable in possessing the power of flight only while young, adults being too heavy to fly, on account of the small size of the wings. This is one of the characteristic birds of the Southern Hemisphere. The specimen exhibited was not as good as could be desired, but it was found impossible to obtain a better one in time for the Exposition. Several handsome Arctic ducks were shown, such as the Harlequin (*Histrionicus histrionicus*), spectacled eider (*Arctonetta fischeri*), Steller's duck (*Eniconetta stelleri*), and the king eider (*Somateria spectabilis*), all noted for their bright colors. The most beautiful American species is the wood duck (*Aix sponsa*), a specimen of which was included in the exhibit.

The great whooping crane (*Grus americana*) of our western prairies was represented by an excellent specimen from Manitoba. It is one of the most striking members of its family and stands about 4 feet high. (Plate 14.)

A strange pheasant-like bird from the Orinoco region is the Hoatzin (*Opisthocomus hoatzin*), an adult example of which was exhibited. This species is of sombre coloring, but is of interest on account of its isolated position in the avian world. Although superficially similar to some of the gallinaceous birds, it has no very near relatives. The young Hoatzins are armed with double claws at the bend of the wing and climb about in trees overhanging the water after the manner of bats.

A bird which attracted much attention was the barn owl (*Strix pratincola*), also known as the monkey-faced owl. This species, on account of its strictly nocturnal habits, is little known to the general public,

although it is rather common over a wide area in the United States. Its curious visage stamps it as a bird of great rarity in the minds of the laymen.

Of almost equal interest to the people at large are two other common American birds, the night hawk and the whip-poor-will, which by many are thought to be one and the same species. These two species were exhibited side by side, and accompanied by explanatory labels, pointing out the differences in structure and habits of the two birds.

Two birds of singular appearance included in the collection were the roseate spoonbill (*Ajaja ajaja*), a bright-plumaged bird of tropical America, remarkable for its flattened spoon-shaped bill and crimson shoulder patches; and the boatbill (*Cochlearius cochlearius*), a nocturnal variety of heron from tropical America, named from its bill, which bears a striking resemblance to the upturned surface of a boat.

Of Arctic birds the exhibit included, among others, the tufted puffin (*Lunda cirrhata*), a member of the auk family, of plain black plumage, peculiar for its high, laterally compressed, bright-colored bill, and curly tufts of white hairy feathers springing from the sides of its head; and the snowy owl (*Nyctea nyctea*), one of the largest species of the owl tribe. This bird is dressed in pure white, relieved here and there by a few black spots. Its plumage is very thick, even the bill and feet being hidden in a dense covering of hairy feathers to protect them from the Arctic cold.

Very owl-like in appearance is the grand potoo (*Nyctibius grandis*), a bird belonging to the whip-poor-will family. It is of a mottled gray and black color, and has an enormous mouth. It inhabits the northern half of South America. The specimen exhibited was of large size, but hardly in so good plumage as many of the North American birds. The oil bird (*Steatornis steatornis*) is related to the goat suckers. It dwells in caverns in the northern part of South America, and was discovered by Humboldt during his travels in that region. It lives upon fruits and berries. An adult specimen was exhibited. A bird which attracted the attention of many visitors was the man-o'-war bird, whose abnormally long, folded wings project far beyond its body. In flight it is one of the most active and graceful of all birds. It is a native of all tropical seas. Of the commoner birds exhibited one of the most curious was the anhinga (*Anhinga anhinga*) or snake bird, a native of Florida and tropical America, where it haunts sluggish streams and wooded swamps, usually perching upon snags or stumps projecting from the water. It has a very small head and long, narrow neck, whence the name "snake bird."

Among the woodpeckers exhibited at Buffalo may be mentioned two species mounted upon one perch and labeled "giant and pygmy woodpeckers." The giant is the imperial woodpecker (*Campephilus impe-*

rialis) of the pine forests of northern Mexico, the largest known member of its family. The other species is the pygmy woodpecker (*Picumnus pygmaeus*), from Brazil, one of the smallest of all woodpeckers. Several other species of woodpeckers were shown, including two bright-colored species from Cuba.

The avian fauna of Central America was prominently represented by the resplendent trogon, or quezal (*Pharomachrus mocinno*), the most gorgeous example of its family. It is a native of certain high mountains of Central America, and is the national bird of Guatemala. It is of a brilliant metallic green above and crimson below, with a flattened crest and long streaming tail coverts extending $2\frac{1}{2}$ feet beyond the body. The Cuban trogon (*Priotelus tenuis*), which was also shown, is confined to the island of Cuba and is noted for the peculiar shape of the tail feathers, which look as if they had been notched at the end with a pair of scissors. A small, plain-colored species, which might easily be overlooked in a collection of this kind, is the crested ovenbird of Brazil (*Homorus cristatus*), which is, however, noteworthy on account of its remarkable nest-building habits. These nests are composed largely of sticks, some of them as thick as one's little finger and 2 feet long, the whole structure resembling a barrel lying upon its side. The nests are about the size of an ordinary flour barrel, while the bird is no larger than our catbird. The jacamars constitute a family of brilliantly colored tropical American species, related to the kingfishers. The species, several of which were represented at Buffalo, are all inhabitants of dense forest recesses, where they pass much of their time perched on dead twigs near the ground. The most striking species is the grand jacamar (*Jacamarops aurea*), of which several specimens were shown. The motmots, represented by several species, are less gorgeous than the jacamars, but have similar habits. They are noted particularly for their habit of trimming their tails, the two central feathers of which are denuded of the webs for a distance of about an inch at the ends.

Among the numerous bright-colored members of the Tanager family may be mentioned the callistes (genus *Calospiza*), some of which are exquisitely colored, the seven-colored calliste (*Calospiza tatao*) being one of the most tastefully decorated. The red-eared calliste (*Chlorochrysa phanicotis*) is unique in having on its shoulders a patch of color not to be matched in any other bird.

Of more brilliant colors, and in many ways the most remarkable assemblage of birds to be found in the Western Hemisphere, is the group known collectively as cotingas. In this family, grouped by certain peculiarities of structure, may be found such singular birds as the umbrella bird (*Cephalopterus ornatus*), the bell bird (*Casmorhynchus tricarunculatus*), the bald fruit crow (*Gymnocephalus calvus*), the cock of the rock (*Rupicola rupicola*), etc., all remarkable for richness

of coloring or some bizarre style of plumage or ornamental appendages. The holy-ghost bird (*Carpodectes nitidus*), of the same family, is almost pure white, with a delicate wash of blue on the upper surface, and an innocent, dove-like expression. Examples of these and many other striking forms of the cotinga family were exhibited.

About 150 specimens of hummingbirds were shown in a special case, representing many of the more interesting species of this exclusively American family. Though diminutive in size and occupying but little space, the gem-like brilliancy of their plumage outshone the larger birds.

REPTILES AND BATRACHIANS.

The exhibit of these classes of American animals included the largest and most characteristic species of which specimens could be obtained. The series consisted entirely of painted plaster casts on bases, with accessories, suggesting the natural environment or habits of the various species.

One of the largest and most interesting specimens was the turtle known as the alligator snapper. This turtle is found in the South-western United States. It is the largest species of fresh-water turtle now existing, and is only surpassed in the class Testudinata by the giant tortoises of the Galapagos Islands. The specimen exhibited is the largest one of the species of which there is any record, and hence the largest American fresh-water turtle thus far known. (Plate 18.) The shell is $29\frac{1}{2}$ inches long and 34 inches wide. It was obtained in southern Texas. Other interesting American turtles exhibited were the snapping turtle, the curious soft-shelled turtle, the box tortoise, etc. A very good specimen of one of the large Galapagos Island land tortoises was also exhibited. Specimens of the mata-mata of Brazil, the most grotesque turtle known, and the large Amazon River turtle were also prepared, but could not be exhibited for lack of space.

The poisonous snakes of North America were represented by the diamond rattlesnake (*Crotalus adamanteus*), the largest and most poisonous American species; the well-known copperhead, and the water moccasin, or cotton mouth, which is much dreaded in the Southern States.

The larger but nonpoisonous snakes of tropical America were represented by the boas. (Plate 16.) The Museum was fortunate enough to obtain specimens of the yellow boa of Jamaica, the Cuban boa (known as the *Maja de Santa Maria*), which is the largest snake of the West Indies, and the well-known boa constrictor of South America. Of the last, a beautiful cast of a specimen 12 feet long and also a cast of a young individual were exhibited. The Cuban and Jamaica boas could not be exhibited on account of reduction of space. Several of

the characteristic small harmless snakes were also displayed, and with them a very instructive preparation representing the nest and eggs of the curious hog-nosed snake and the newly hatched young snakes. (Plate 17.)

The American lizards are for the most part too small to be attractive at an exposition, but the Pan-American exhibit included a fine cast of the so-called Gila monster, which is the only known poisonous lizard. It inhabits the arid regions of the Southwestern United States and adjacent parts of Mexico. Its venom is powerful and may cause death, but as it is a very sluggish creature cases of poison are not frequent.

Two large Cuban lizards found a place in the exhibit, the Cuban iguana (Plate 15), one of the largest of American lizards, reaching a length of 5 feet, and the Cuban chameleon, which, like the Old World chameleons, can change its color, though it is not allied to them, but belongs to the American family of *Anolis* lizards. The cast of the Cuban iguana in its pose and coloring was one of the most satisfactory and lifelike pieces prepared for the Exposition.

The curious lizard known as the "glass snake" was also included in the exhibit. This is a lizard without limbs, and hence resembles a snake. It has the power of detaching its tail by powerful muscular contractions, and as in this case a new short pointed tail grows out, it has formed the basis of the stories of the mythical "hoop snake."

The exhibit of batrachians was smaller than that of reptiles, but included the more characteristic American forms, such as the mud eel, tiger salamander, etc., and several kinds of toads and frogs. Among the latter was the Cuban toad, remarkable for its large size, and the large Cuban tree frog.

FISHES.

The exhibit of fishes comprised more than 100 specimens, of which the majority were painted casts. The object of the exhibit was to represent as fully as space would permit the larger, more characteristic, and more important American species. It was found impracticable to make a satisfactory exhibit of West coast species, but the most important forms on the Atlantic coast and the fresh waters were well represented. (Plate 6.)

The series included many of the most important game and food fishes, such as the sheephead, Spanish mackerel, striped bass, tarpon, bluefish, croaker, mullet, and menhaden. Tarpon, which is well known as one of the largest American game fishes, was represented by a stuffed skin from Florida, presented by Bennett H. Young, esq.

The Museum was fortunate in obtaining for this exhibit a good cast of the man-eater, or great white, shark, 13½ feet in length. Specimens of the dusky shark and shovel-nose shark were also exhibited, the former with the curious remora, or sucking fish, attached. The allied

skates were represented by a common species which reaches a length of 2 feet, and the arraya, or stingray, of the coast of Brazil, which enters the Amazon and other rivers.

Several of the largest species of the true fishes were included in the exhibit, such as the horse mackerel, which reaches a length of 10 feet or more, with a weight of 1,500 pounds; the barracuda of the tropical Atlantic, which reaches a length of 6 feet; and the wolf fishes, found in the deep waters of both the Atlantic and the Pacific.

The exhibit included many curious and grotesque marine fishes, such as the sea bat, a small species often sold in curiosity shops; four-eyed fishes, so named on account of the dark horizontal line crossing the eyes; the poison toad of the tropical Atlantic, which is much feared by the fishermen, who say that its spines inflict very painful wounds. Besides these are included the well-known flying fish, the large sail-fish, remarkable for the development of the dorsal fin, a portion of which extends above the surface of the water when the fish is swimming; the beautiful thread-fish, with its thread-like fins, and many others.

The exhibit of tropical Atlantic fishes included many of the larger characteristic species found in Key West and in the West Indies, including some used as food in Cuba. Among these were the lane snapper, the most important food fish of the Havana markets; the dog snapper; the Margate fish, an important food-fish in Key West, Nassau, and Havana; several other species of grunts, among which the common or white grunt is the most abundant food-fish at Key West. The groupers, one of the most characteristic groups of tropical fishes, were represented by numerous species, such as the rock hind, the Nassau grouper, one of the most attractive of its tribe and of large size, reaching a weight of 50 pounds; the red grouper, a common species of the Gulf of Mexico; and most remarkable of all, the jewfish, which is perhaps the largest of the tribe; it reaches a weight of 500 pounds. Specimens weighing from 150 to 250 pounds are sold in pieces in the market like halibut.

Other especially interesting species were the beautiful angel fishes (Plate 20), some of which stray northward as far as the coast of New Jersey, but are characteristic of the tropical Atlantic; and the rose fish, remarkable for its brilliant colors; the red drum (Plate 19), etc.

In addition to the marine fishes it was considered especially desirable to display the more characteristic fresh-water species of North and South America. The latter series was necessarily confined to species inhabiting the Amazon and its tributaries, as opportunities were not afforded to obtain specimens from the southern rivers. Among the North American forms were such well-known game fishes as the grayling, remarkable for its large dorsal fin; the pickerel, etc. The fishes

of the Great Lakes were represented by the fresh-water drum, white fish, and large catfish, which reaches a weight of 100 pounds or more, the moon eye and the red-horse mullet. The series also included specimens of the buffalo fish, the largest of the suckers, reaching a weight of 50 pounds or more, found mainly in the Mississippi River and its tributaries. Species peculiar to the fresh waters of North America were the gar pike and mud fish, two very old types of fishes, and the singular paddle fish of the Southern and Western rivers.

Among the most abundant and characteristic fresh-water fishes of South America are the catfishes, of which there are many species, some of which are extremely interesting on account of their curious mail-like scales and large spines. Among those exhibited was the small acary cacinaba, in which the body and head are entirely covered with a coat of mail, made up of interlocking, bony plates. It is typical of the large group comprising more than a hundred species. Several other species of acary are included in the series. Another characteristic group of fresh-water fishes of South America are the characins. They are carnivorous fishes, feeding on various aquatic animals, including members of their own class. Several representative forms of this characteristic group were included in the exhibit, such as peixe cachowo, one of the most formidable of the characins, reaching a length of 4 feet; the jeju and the agulha, which are valued as food-fishes. Specimens of the electric eel could not be obtained, but it was represented by an allied form, the itui, a common species of tropical America.

At an early stage in the development of plans, it was proposed to add to the exhibit of fishes characteristic of American waters a series of enlarged models of fishes of the deep sea. It proved, impossible, however, to construct these in the time available, but a single example was prepared. The species chosen was one known as *Ethopprora effulgens*, belonging to a characteristic family of deep-sea fishes, many of which are remarkable for their phosphorescent organs. In the species exhibited there is in addition the luminous spots on the sides found in many deep-sea fishes, a large luminous area like a lantern on the top of the head. This extraordinary creature must present a remarkable appearance when swimming in the dark abysses of the ocean. The model shown at Buffalo was eight times natural size and had a length of 4 feet (Plate 22). The luminous spots on the sides were represented by buttons of glass connected with the interior by tubes. The luminous protuberance on the head was modeled in gelatine and tinted. The model was so connected with the electric-lighting system in the building that a gentle glow appeared in the side spots and frontal protuberance, producing a very striking and it is believed a quite accurate notion of the appearance of a living phosphorescent deep-sea fish.

THE EXHIBIT OF THE DEPARTMENT OF ANTHROPOLOGY.

By WILLIAM H. HOLMES,
Head Curator.

When plans were required for an anthropological exhibit to form part of the Government's display at the Pan-American Exposition in Buffalo, 1901, it was not difficult to decide as to what portion of the very wide field included in the Museum department should be selected. The Pan-American concept furnished the suggestion, and it was arranged to present in the most striking manner possible a synopsis of the Pan-American aborigines, the native peoples of America, from the Eskimo of North Greenland to the wild tribes of Tierra del Fuego. The most salient ideas or features available for exposition presentation in this field are (1) the peoples themselves, and (2) the material products of their varied activities.

GROUPS OF LAY FIGURES.

The most important unit available for illustrating a people is the family group—the men, women, and children, with their costumes, personal adornments, and general belongings. It was therefore decided to undertake the preparation of 12 lay-figure family groups, illustrating such tribes as would serve best as types of the ethnic provinces distributed between the northern and southern extremes. With such a set of groups geographically arranged upon the exhibition space it was conceived that the student, and even the ordinary visitor, might, by passing from north to south or from south to north through the series, form a vivid and definite notion of the appearance, condition, and culture of the race or peoples called American Indians, the race so rudely and completely supplanted by the nations of the Old World. Each lay-figure group comprises from four to seven individuals, selected to best convey an idea of the various members of a typical family, old and young of both sexes.

Two of these groups, the Greenland Eskimo and the Patagonian, occupy cases 8 by 12 feet in horizontal dimensions and stand at the northern and southern extremities of the exhibit. The other cases are smaller and accommodate from three to six figures. Each member of a group is represented as engaged in some suitable occupation. The activities of the people are thus illustrated and the various products of industry are, as far as possible, brought together in consistent relations with the group.

In building these figures the closest possible approach to accuracy was sought, but satisfactory costumes were not always available, and collections illustrating arts and industries were found to be deficient,

save in a few cases. It is therefore felt that the exhibit is not yet complete and that many changes will be necessary to bring it up to a satisfactory standard. It was impossible, in the short time allotted for the work, to secure life masks of the people, save in a very few cases, but the sculptors were required to reproduce the physical type in each instance as accurately as the available drawings and photographs would permit. Especial effort was made to give a correct impression of the group as a whole, rather than to present portraits of individuals, which can be better presented in other ways. Life masks, as ordinarily taken, convey no clear notion of the people. The faces are distorted and expressionless, the eyes are closed, and the lips compressed. Like the ordinary studio photograph of primitive sitters, the mask serves chiefly to misrepresent the native countenance and disposition; besides, the individual face is not necessarily a good type of a group. Good types may, however, be worked out by the skilful artist and sculptor, who alone can adequately present these little-understood people as they really are and with reasonable unity in pose and expression.

The lack of appropriate and complete costumes, especially for the women and children, proved the most serious drawback. An attempt was made to remedy this by sending collectors to the field, but only one of four expeditions sent out returned in time to be of service in the preparation of this exhibit.

It is well understood that for exposition purposes the assemblage of family groups—or larger units—of the living peoples would be far superior to lay-figure exhibits. The real family, clothed in its own costumes, engaged in its own occupations, and surrounded by its actual belongings, would form the best possible illustration of a people; but such an exhibit, covering the whole American field, would require much time for its preparation as well as the expenditure of large sums of money. Furthermore, from the museum point of view, the creation of a set of adequate and artistic lay-figure groups forms a permanent exhibit which, set up in the museum, continues to please and instruct for generations; whereas the real people, howsoever well assembled, must scatter at the close of the exposition, and nothing is left for future museum display. Such assemblages of our native peoples as those of the World's Columbian, the Trans-Mississippi, and the Pan-American expositions are highly interesting and instructive, but their influence is soon lost, since they reach only the audience of the season.

Future expositions may essay the bringing together of living representatives of type tribes, scientifically presented and free from the commercial incubus, but to secure satisfactory results the work must needs begin not less than two years before the opening of the exposition.

The family groups and other lay figures included in the present exhibit are such as could be brought together in the short period allotted for preparation, and represent the following tribes:

1. North Greenland Eskimo.
2. Eastern Eskimo.
3. Alaskan Eskimo.
4. Chilkat Indians, Alaska.
5. Hupa Indians, California.
6. Sioux Indians, the Great Plains.
7. Navaho Indians, the arid region.
8. Zuñi Indians, the arid region.
9. Cocopa Indians, Sonora, Mexico.
10. Maya-Quiche Indians, Guatemala.
- 11*a*. Zapotec Indian woman, Oaxaca, Mexico.
- 11*b*. Jivaro Indian man, Brazil.
- 11*c*. Piro Indian man, Brazil.
12. Tehuelche Indians, Patagonia.

Exhibits 2, 3, and 11 of this series were not completed as family groups and remain assemblages of independent figures simply.

DESCRIPTION OF THE GROUPS.

The first exhibit of the series (Plate 23), beginning at the north, shows an Eskimo family of Smith Sound, northwestern Greenland. These are the most northern inhabitants of the world known. On account of the prevalence of ice the year round they make little use of the *kaiak*, or skin boat, employed so constantly by the more southern Eskimo, using the dog sled for transportation. Their clothing is of skins of the seal, reindeer, birds, and dogs, and their houses are often built of snow. Their activities are nearly all associated with the mere struggle for existence.

This group represents a family as it might appear in the spring, moving across the ice fields. The young man has succeeded in clubbing a small seal, and having called on the sledge party to haul it home is laughed at by the elder man, who tells him he should have carried it on his back.

This episode is chosen with the view of illustrating the noteworthy fact that these farthest-north people are exceptionally cheerful in disposition, notwithstanding the rigor of the climate and the hardships of their life. The woman, who carries a babe in her hood, is about to help attach the seal to the sledge, and the girl, who plays with the dogs, and the boy, who clings to the back of the sledge, are not insensible to the pleasantries of the occasion.

In the second exhibit (Plate 24) three south Greenland figures take the place of the family group, which could not be completed in time.

They represent the Eskimo who inhabit Greenland, the shores of northern Labrador, and Hudson Bay adjoining. The figure at the right is that of a young woman of southwestern Greenland, her dress resembling that of a Lapp. Her people have been under instruction of Moravian missionaries for generations. The middle figure represents the native right-hand man of the intrepid whalers, who before the discovery of coal oil ransacked Hudson Bay for oil and baleen. The woman at the left is from Ungava Bay, and is dressed in aboriginal costume of reindeer fur, little modified by outside influences. Her loose, roomy garments correspond with those figured by the early voyagers. In her left hand she carries a large wooden plate, while the right is lifted to ease the headband which passes around the forehead, sustaining the babe held in the hood behind. The eastern Eskimo are especially interesting on account of their association with the exploring expeditions sent out in the last century to search for the northwest passage and the North Pole.

The third case (Plate 25) contains three lay figures of the western Eskimo, who inhabit the shores of the northwestern seas from the mouth of the Mackenzie River around Alaska to Mount St. Elias. Their mode of dress and living varies according to the animals on which they depend and the contact they have had with other races. In this group will be seen a woman and child from the Mackenzie River district dressed in caribou skins, a man from about Norton Sound holding his barbed harpoon, and a woman from Bristol Bay clad in marmot skins. The Mackenzie and Bristol Bay people are out of touch with the great fleet of whalers, and their arts are not greatly modified, but the Norton Sound Eskimo have been under instruction of Russians and Americans for more than a hundred years.

The fourth group (Plate 26) illustrates the Chilkat Indian family of the North Pacific ethnic province. They live on Lynn Canal, or channel, in southeastern Alaska, and belong to the same family as the better-known Tlinkits. They are selected to stand as a type of the region because they are the only tribe that still retains in a measure the aboriginal costume. They are in commercial contact with the Athapascan family over the mountains to the east, from whom they obtain horns and wool of the arctic goat. The wool is used in making the famous Chilkat blankets, which are not woven in a loom, but the foundation strands are suspended from a bar of wood and fall free at the ends or are tied up in bundles. The figures of the design are inserted separately, as in a gobelin tapestry. The men of the tribe carve the utensils and ceremonial objects from wood and horn. In this group we see, sitting on the floor, a man carving a wooden mask. He is dressed in a buckskin suit, whose decorations show contact with the Tinné tribes over the mountains. The woman opposite is engaged in making a basket, with her babe in its cradle by her side. Standing

behind is a young girl offering food in a carved wooden dish to a man who wears one of the fine Chilkat blankets over his shoulders. Usually the food dish is placed on the ground and the men sit or squat about it, the women eating separately. The costumes are of buckskin made in the primitive style, and numerous articles pertaining to the household or employed in the arts are scattered about the group.

The Hupa Indians (Plate 27), shown in the fifth group, inhabit the valley of the same name in northwestern California. They represent in this series of family groups the mixed tribes of California and Oregon. Physically the Hupa stand between the large-bodied Sioux and the under-sized Pueblo Indians. In language they belong to the Athapascan family in common with the Tinné of Canada and the Apache and Navaho of Arizona. They live on a mixed diet of meat, fish, and acorns; dress in deerskin, and are fond of personal ornament. Their better houses are of cedar planks and the floor is slightly sunken beneath the surface of the ground. An important industry among them is the harvesting, transporting, storing, and milling of acorns, together with the preparation of food from the meal.

In this group the man is making fire with the twirling drill, the standing woman carries a load of acorns just gathered, and the sitting woman is pulverizing acorns in a stone mortar surmounted by a basket hopper held in place by the miller's knees.

Group 6 (Plate 28) illustrates a Sioux family, which is taken as a type of the inhabitants of the Great Plains ethnic province. It is on these plains that the Sioux, Algonkin, and Kiowa developed their peculiar culture. The activities of all these tribes were created and fostered by the buffalo—including their food, dress, tents, tools, utensils, arts, industries, social life, lore, and religion. In the group appear the man, who is the hunter, returning with a trophy of the chase; the wife, who is butcher, tanner, clothier, purveyor, pack animal, and general drudge, is dressing a hide; the young girl is beading a moccasin for her sister, who is interested in the work. The smaller boy, with bow and arrow, welcomes the father. The tribes of the Great Plains are thought to have been in early times sedentary, but the acquisition of the horse and the gun fostered a more roving life.

Group 7 (Plate 29) illustrates a Navaho Indian family of the Pueblo province. They belong to the Athapascan family, whose home is in northwestern Canada and central Alaska. They are among the most interesting tribes of the United States since, under Spanish direction, they laid aside their wild hunting habits, becoming herdsmen of sheep and other domestic animals and learning to weave and to work in metals. Their kinsmen, the Apache, on the other hand, fled from the conquerors and remained little affected by civilization down to the present time.

The group includes three figures. The man is at work with modern

implements of iron, shaping the silver ornaments so skilfully wrought by the workmen of his tribe. Two women are engaged in the most notable industry of this people, the spinning of yarn from native wool and the weaving of blankets.

The Zuñi Indians, represented in the eighth family group (Plate 30), live in pueblos on the table lands of western New Mexico and stand for the sedentary town-building type of the Pueblo region. They were visited at the beginning of the 16th century by the earliest Spanish explorers, and have been a subject of study by ethnologists for many years. They dress in woolen clothing, are agriculturists as well as herdsmen, and make excellent belts, blankets, and pottery. At the same time they are devoted to their ancient religion.

This group includes in the foreground a young woman engaged in weaving one of the artistic belts used for the waist. At the right is seated an old man occupied in drilling a bit of stone with the ordinary pump drill. His dress is that worn during the Spanish period. Near the middle of the group stands a young girl in the usual costume, who has just returned from the spring, bearing upon her head a water vessel. On the right are two children interested in their frugal meal.

The Cocopa Indian family, shown in group 9 (Plate 31), represents the Sonoran ethnic province. They occupy the lower valley of the Colorado River, Mexico, from the international boundary to the head of the Gulf of California. Although they were visited by Spaniards in 1540, and have been in contact with the Caucasian race for two hundred years, they retained their primitive traits up to about 1890. They subsist largely by means of agriculture, feeding partly on game and fish, with various seeds, roots, and fruits. They dwell in scattered settlements, usually of one to half a dozen houses, which pertain to a family or clan. Little costume is used, the men until recently habitually wearing skins and the women petticoats of the inner bark of willow, as seen in the illustration. Their faces are habitually painted, and they are tattooed moderately.

The group includes five figures. A young man with bow and arrow is engaged in teaching a boy to shoot; the woman is pounding corn in a wooden mortar, and the young girl carries the babe and concerns herself with the bow practice of the boy.

The tenth family group (Plate 32) shows the Maya-Quiché of Guatemala. These people occupy also parts of Chiapas and a small area in western Honduras; at one time they were the most highly cultured of all the native peoples of the Western Hemisphere. They had an artificial basis of food supply, dressed in delicate fabrics, and were capable of erecting vast terraces and stepped pyramids surmounted with buildings adorned with sculptures and paintings. They were of moderate stature, not warlike, but industrial, and the sculptures and paintings revealing their religion are remarkably free from bloody scenes. They

number in Central America, at present, several hundreds of thousands. The family group here presented includes the man with staff and bearing a net filled with fruit, one woman working at the mill, a second woman carrying a basket of fruit in her right hand and a gourd bowl in the left, while the girl walks by her mother, and holds a decorated globular, gourd vessel.

The eleventh group (Plate 33) consists of three figures, a woman of Oaxaca, southern Mexico, and two men, representing the Piro and Jivaro tribes of the headwaters of the Amazon. The Oaxacan woman is dressed in a skirt of striped native-woven cloth, held by a belt. The upper part of the body is covered with a tastefully decorated tunic. The head is protected by a long sash or rebozo. She carries in her left hand a red earthen drinking cup and in her right two gourd vessels. The third figure is a Piro man, Arawakan family, headquarters of the Ucayle, interesting because tribes speaking the same language were met with by Columbus on his first voyage to America. He wears a tunic of native make, embellished with artistic patterns, and confined only by a sash of beads decorated with skins of birds passing over the right shoulder and beneath the left arm. The headdress consists of a bark band in which are set three bird plumes. He holds in both hands a ceremonial baton.

The Jivaro man lives on the headwaters of the river Marañón. He wears a tasteful and brilliant feather skirt and headdress, ornaments of teeth, beetle wings, and seeds. This tribe, one of the most forceful and independent in South America, preserve the dried heads of their enemies.

The Patagonians, group 12 (Plate 34), taken as a type of the far southern tribes, apply to themselves the name Tzoneca, but their neighbors call them Tehuelche, or southerners. They live on the plains and desert areas of southern Patagonia, and all of the arts of their lives grow out of the region. They dress in the skins of animals. Their rude tents, or toldos are made from the hides of the same animals. Their furniture, food, and arts are occasioned by the same environment. Living on animal diet, they resemble the Plains Indians of the United States, being tall, bony, and athletic. When the Spaniards had introduced the horse into America it took kindly to these grassy plains, and the Indians changed their arts to adapt them to this new domestic animal. On horseback they hunt the guanaco, the American ostrich, and various other animals.

In the group the family is on the point of breaking camp. The man, wearing a skunk-skin robe, with bolas in hand, is ready to mount his horse. One woman has already mounted, and the boy assists in completing her outfit. The second woman is rolling up skin robes of the household, while the little girl halts the pet ostrich, and the babe sleeps in its novel cradle.

DWELLING GROUP MODELS.

The second most important concept available for Pan-American presentation embraces the arts and industries of the people. First in order among these is architecture—the building arts—represented by the dwelling or the cluster of houses and outbuildings occupied by a family or communal group. On account of the lack of room these subjects had to be presented by models on a small scale—one twenty-fourth actual size—but it was found that all essential details could be reproduced and that something of the people and their occupations could be shown. The subjects were selected, as were the lay-figure family groups, to represent type peoples distributed at intervals between the far north and the far south. The series begins with the snow house of north Greenland and ends with the skin-covered wind-break of southern Patagonia.

The list of dwelling group models completed for the Exposition is as follows:

1. Snow houses of the Greenland Eskimo.
2. Earth house of the Alaskan Eskimo.
3. Wooden dwellings of the Haida, representing the North-west coast tribes.
4. Skin and bark-covered lodges of the Montagnais Indians, Labrador.
5. Dwellings of the Sierra (Digger) Indians, California.
6. Skin lodges of the Great Plains Indians.
7. Grass houses of the Wichita Indians, Indian Territory.
8. Earth lodges of the Pawnee Indians, Dakota.
9. Cliff dwellings (ruins), Arizona.
10. Grass and adobe houses of the Papago Indians, old style, Arizona.
11. Pile dwellings of the Venezuela tribes, South America.
12. Skin shelters of the Patagonians, South America.

The series was intended to include sixteen groups, but in the limited time allowed the work could not be completed.

The first model of the series (Plate 35) shows a dwelling group of Central Eskimo. These people live on the area between Hudson Strait and Baffin Bay. Their winter houses are built of blocks of compacted snow laid up in a spiral manner, forming a dome. The blocks are some 3 feet long, 2 feet high, and 6 inches thick. The main chamber of the house varies from 5 to 12 feet in height and from 7 to 15 feet in diameter. Over the entrance a square is cut out and covered with seal intestine for a window. The main domed chamber is connected by passageways with one or more subordinate chambers which serve as storerooms. In the summer the natives fish in the open water; in winter seals are taken by cutting

holes in the ice. The clothing of the men and women is made from skins of seals and deer, and consists of outside and inside trousers, jackets—those of the women having hoods—boots, and inside boots or socks made of light deerskin or birdskin.

In the second model of the series (Plate 36) we have a dwelling of the Kinugmut Eskimo, taken as a type of the Alaskan region. The Kings Island people are Kinugmut Eskimo, the same as at Port Clarence and Bering Straît. Their island has steep shores and their houses often resemble cliff structures. The structures here shown include the large communal house and the frame for keeping food out of the reach of the dogs. The house is built of logs set on end and a cob-work of logs resting on these. The whole is covered with earth and moss. Entrance is at the outer end of a long gallery and ventilation is through the roof. A portion has been cut out of one face of the model to expose to view the interior arrangements of the dwellings. There are side rooms for storage. The Port Clarence Eskimo live by hunting sea mammals and by fishing. This special locality is now interesting, since the United States is there making the experiment of introducing the domesticated reindeer.

The third model (Plate 37) illustrates a dwelling group of the Montagnais Indians, a type of the eastern Canadian province. The Montagnais are of Algonquin stock, and were distributed formerly throughout Labrador as far north as Ungava Bay. They lived by hunting and fishing. Their dwellings are of skins laid on a framework of poles, not sewed together, but held down by trunks of small trees leaned against the outside and stones piled around the base. The group includes finished tents, wood pile, staging filled with skins and robes, men painting a robe, women drying skins, and birch-bark canoes. The Montagnais dress in deerskin robes, quite like those of the Eskimo, their neighbors, but well made and decorated with paint rather than embroidery. Their canoes are of bark, and not of skins, as are those of their neighbors in the north.

The fourth model (Plate 38) represents a dwelling group of the Haida Indians, a type of the north Pacific ethnic region. The Haida Indians inhabit the Queen Charlotte Islands, lying in the Pacific Ocean 75 miles north of Vancouver Island. They are a separate linguistic family. Their houses are in the form of a regular parallelogram, averaging 50 feet in width and 35 feet in depth. Posts were planted in the ground, joined by means of timber, and these were covered on the roof and sides anciently with hewn planks. In front are planted totem poles, upon which are carved animal totems representing the crests of the different clans inhabiting the house. Entrance is often by means of a low doorway cut in the base of the totem post. All over the front also are painted heraldic emblems connected with their family symbolism. The Haida tattoo their bodies with various designs, and now clothe themselves largely after the manner of the whites.

The fifth model (Plate 39) illustrates a dwelling group of the so-called Digger Indians of the Californian region. The numerous tribes belong to several linguistic families, and occupy an extensive area in California, Utah, and Nevada. They received their name from the use of roots in their arts. Their dwellings are primitive, but modified by contact with the whites. This group includes the communal house, built of boards and shingles; the mill shelter; the summer house, where the household arts are carried on; the storage platform, and the granary. As these people subsist largely on acorns, the greater part of the woman's life is spent in gathering the nuts, carrying them home in a conical basket suspended on the back by a band passing across the forehead, drying and hulling them, grinding them in stone mortars, sifting, cooking, and serving the meal in the form of mush or bread. The men are hunters, fishers, and laborers.

The sixth model (Plate 40) is that of a dwelling group of the Great Plains Indians. Here dwelt formerly Siouan, Algonquian, Kiowan, and Shoshonean tribes in tents of buffalo and deer hide. A set of poles lashed together at the top, a cone-shaped covering over that, held down by pegs driven into the ground about the edge, constituted the dwelling. The fireplace was in the center, and the furniture consisted of abundance of skins for beds and a few ladles or spoons of wood or horn for dishes. Cooking was done by roasting and stone boiling, and pemmican or dried buffalo meat was laid up for time of need. The men were hunters and warriors, and the women were skilled in all the peaceful arts that grew out of the chase.

A dwelling of the Wichita Indians is the subject of the seventh model (Plate 41). This tribe is of Caddoan stock, and formerly inhabited northern Texas. Their dwellings are generally cone shaped and dome shaped. The frame is of poles tied together, like lattice-work. Into this bundles of grass are woven in rows, imbricated so as to shed the rain. The group shows a finished house, one in process of erection, and a communal shelter supported on poles. The Wichita have become agriculturists, and dry their corn on hides or frames. They have also adopted the metal cooking vessels of the whites. The method of thatching is to be compared with that of the Papago in Sonora, Mexico.

The eighth model (Plate 42) represents a dwelling group of the Pawnee Indians, a type of the Missouri Valley region. The Pawnee formerly lived in Nebraska, on the Platte River. They belong to the same family as the Arikarees in North Dakota and the Caddoes in Louisiana and eastern Texas. Although their home was in the country of the skin-tent dwellers, they continued to build the ancient northern type of earth-covered abode with slightly sunken floor. The frame consists of logs set on end in a circle and connected with other timbers. The roof is of radiating poles, rafters covered with brush and then with a thick layer of earth and sod. From the circular chamber a

passage several feet in length leads outward, forming the doorway. This type of dwelling is also interesting in that it is suggestive of the origin of many of the smaller mounds in different parts of the Mississippi Valley.

The ninth model of the series (Plate 43) represents an ancient cliff dwelling of the Pueblo country. The arid region of Colorado, Utah, Arizona, and New Mexico abounds in canyons and plateaus, and the rocky walls have been carved by the elements into many fanciful shapes. Here also were formed shelves, shelters, and caverns, and these were extensively utilized by the ancient tribes for dwelling purposes, from which circumstances they derive their name—Cliff Dwellers. The fronts of the recesses were closed with stone walls, and partition walls divided the space into rooms of various sizes. These houses were reached by natural pathways, by steps cut into the rock, and by wooden ladders, and they served for defense as well as for abode. By the remains of industrial arts found in the cliff structures, their builders are shown to have been the ancestors of part or all of the modern Pueblo tribes.

A dwelling group of the Papago Indians is shown in the tenth model (Plate 44). The type is that of the Sonoran region. The Papago Indians are of Piman stock, inhabiting Pima County, Arizona, and the State of Sonora, Mexico. They dwell in dome-shaped grass houses, in which a frame of mesquite poles is fastened together with yucca twine, covered with long grass and mud, and protected with stalks of the ocotilla. Other outbuildings are the kitchen circle, the pole-supported shelter, and the ruined house showing structural features. The food of the Papago is chiefly vegetal, the staple being the beans and pods of the mesquite tree. They are clever potters. The Papago wear little costume, the modern dress being of European or modified European pattern. The men formerly wrapped skins about their loins, and the women were clad in fringed petticoats of shredded bark and leaves.

The eleventh model (Plate 45) illustrates the home of the Goajiros Indians of Venezuela, a type of the Orinoco ethnic province. The discoverers of the coast of South America were astonished to find tribes living in huts built out over the water, and so they gave to this region the name of Venezuela, or Little Venice. The huts, only a few feet square, stood among the trees, on platforms constructed by interlacing the stems. The houses later were supported on piles or trunks of trees, sunk in the water and standing 5 or 6 feet high. In the center of each platform was a pile of earth, and on this the fire was built and kept continually burning. Over the platform was suspended a low roof thatched with palm leaves. Access to the house was had by means of a notched tree trunk. The natives moved about in dugout canoes, and when the water was high one of these could be seen tied

to every notched ladder. Little clothing was worn, but there was much decoration of the person with feathers and seeds, and the bones and teeth of small animals.

The twelfth model (Plate 46) illustrates the houses and human life of the Tehuelche tribe of Patagonia.

Fabulous stories are told of their stature. They are, in fact, among the tallest people in the world. Their food is derived mainly from the chase. They clothe themselves in skins of animals, and their women are expert not only in dressing hides, but also in decorating them with patterns of various colors.

For a house the Tehuelches cover a framework of sticks with a number of skins sewed together. These shelters, generally open in front, are called toldos, and the furniture consists of only a few rude appliances.

In this exhibition are shown a tent in process of construction, a finished tent, and a temporary shelter. Men and women are engaged in the various industrial activities of the tribe—dressing hides, curing meat, and erecting the tent.

This group forms one of a series designed to set forth the dwelling and home life of native tribes in the Western Hemisphere.

EXHIBITS ILLUSTRATING LEADING ARTS AND INDUSTRIES OF THE NATIVE AMERICANS.^a

Thirteen series of exhibits illustrating native handicraft were presented, each with as much elaboration as the subject and the space would permit. They represent those activities that seem best qualified to convey an idea of the culture status of the American race. Each series of products is made to cover the full range of native achievement in the branch illustrated.

The exhibits include the following subjects:

1. Fire-making apparatus.
2. Bows and arrows.
3. Throwing sticks.
4. Harpoons.
5. Water craft.
6. Basketry.
7. Woven fabrics.
8. Pottery.
9. Sculpture.
10. Personal ornaments.
11. Tobacco pipes.
12. Musical instruments.
13. Pictography and writing.

^aThe majority of these exhibits were arranged under the direct supervision of Prof. Otis T. Mason.

The first of these exhibits (Plate 47) illustrates the important art of fire making. The fire drill was in almost universal use. It consists essentially of two parts, the vertical drill of hard wood and the horizontal socket piece of soft, dry wood. The drill is rotated by the hands, by a strap, or with a bow. The fire is produced by the friction of the drill in the socket piece, the wood dust in which the fire arises falling out of a notch in the side of the socket and igniting. With a reasonable amount of experience fire may be made by almost anyone using the specimens shown in this series.

The second exhibit (Plate 48) shows the chief types of bows and arrows for the several culture regions of the American continent, beginning with the Arctic province at the north and ending with the Fuegian at the Straits of Magellan. The eastern Eskimo, on account of the poverty of material, make a compound bow of whale's rib, formerly lashed together with sinew, but now riveted and wrapped. The western Eskimo bow is backed with sinew, and in many examples is indistinguishable in shape from the Tartar bow on the Asiatic side. Sinew backing continues down the Pacific side of the continent to the Pueblo region, where the material is shredded and mixed with glue. Over all other parts of America the bow is a simple piece of wood in various forms, according to locality.

The arrow furnishes one of the best bases for classifying peoples, its feathering, shaft, and head being subject to modifications of material, size, number of parts, and shape of parts in endless variety.

The third exhibit (Plate 49) shows the distribution of the projectile apparatus called "atlatl" by the ancient Mexicans, and throwing stick, or dart thrower, in ethnological literature. The apparatus consists of a shaft of wood, either a round stick or a flat board, with a groove on top. At the manual end or base may be seen one or more pegs, notches, or perforations designed to receive the thumb or one or more fingers of the right hand. At the working or outer end is a hook of some kind to fit into a hollow at the end of the harpoon, dart, or other projectile. The throwing stick is universal among the Eskimo; occurs also on the north Pacific coast, and here and there among the tribes southward; in the Pueblo country; in Sonora, in Mexico; in great numbers throughout southern Mexico and Central America; in southern Florida; along the Cordilleras to the borders of Peru; at various places on the Amazon, and in the Mato Grosso. Here for the first time a series of these interesting projectile devices are brought together and exhibited in geographic order.

The fourth exhibit (Plate 50) sets forth the different forms of harpoons throughout the Western Hemisphere. It is the universal hunting device among the maritime aborigines, being found all the way from the farthest north to the Straits of Magellan. A harpoon is a spear with a movable head attached to the shaft by a line, for the

purpose of retrieving the game. There are two varieties, the barbed and the toggle harpoon. The barbed harpoon is simply the head of a barbed spear, having a short line attaching it to the front end of the shaft. It is impelled from the hand, from a bow, or from a throwing stick. The toggle harpoon has its head hinged on the end of a thong, and when it is driven into an animal turns and forms a T-shaped attachment, as on the end of a trace chain. The simplest form of the harpoon is found at the Straits of Magellan, and for this reason the series begins with the most southern example and proceeds northward to the Arctic region, where the Eskimo, assisted by the fishermen and the whalers of the world, have perfected the toggle variety. The harpoon is used almost entirely in hunting animals by water, although there are harpoon arrows, used for birds. This will be plain when it is remembered that all harpoons are made for the purpose of securing the game after it is struck. When an animal is lanced on the land the hunter has an opportunity of following up his effort, but in the water the whale, walrus, seal, fish, otter, or turtle usually disappears, and the float, shaft, bladder, or some such light attachment enables the hunter not only to secure his game, but to recover the precious head of his weapon.

The fifth exhibit (Plate 51) consists of boat models and shows the remarkable connection between environment, materials, and inventions in navigation. Beginning with the Arctic shores, the Eskimo rides in a skin-covered *kaiak* and carries freight in a skin-covered scow, or women's boat. All over Canada and northern United States the riding boat and freight boat are made of a light framework covered with birch bark. It was possible in one of these, by paddling and by carrying across portages, to pass into any tributary of the Yukon, Mackenzie, and St. Lawrence rivers—the longest inland journey by water possible in the world. One could even cross the watershed between the Great Lakes and the Mississippi, and pass on to New Orleans. In eastern United States only poor dugouts were known. On the Missouri River a crate of sticks was covered with hide of the buffalo, and called a bull boat. On the Pacific coast of North America canoes capable of making sea voyages of 500 miles were dug out from the stem of a single tree. The same is true of the Caribbean area, where the Caribs, in similar craft, visited every land around the borders of that sheet of water. On the shores of Brazil fishing parties went out of sight of the land in *sangadas* of light logs, which were fitted with sails. Floats of reed were known in the southern States of the Union and on the west coast all the way from middle California to southern Peru. In central Brazil a "wood skin," cut from the bark of a tree in a few minutes, was a common means of transportation, and the Fuegians made seaworthy craft by sewing three pieces of bark together, one forming the bottom and the other two the sides.

The parts were sewed with baleen and made water-tight by means of gum.

It is the design of the sixth exhibit to show the types of basketry for the whole American continent. The series begins in the upper left-hand corner of the case with the coiled basket of the Eskimo; then follow Tinné basketry, from interior Alaska; bark work, from Canada; cane work, from the Gulf States; twined work, from southeastern Alaska; checker, diagonal, twined, and coiled work, from the Pacific States of the Union; coiled and diagonal work, from Mexico; wicker work, from Central America; diagonal work, from Guiana; and coiled work, from Magellan Straits. The species of plants used, and the annual rainfall, which determines the toughness and pliability of the material, govern largely the technic and the quality of basketry in the several culture regions.

Exhibit No. 7 (Plate 52) is designed to show the chief types of textile fabrics in various culture regions of the two Americas. The general term weaving is sometimes applied also to basketry and matting, but here the material is first made into yarn or twine by primitive modes of spinning, either in the fingers, on the thigh, or with a spindle. The frames on which the weaving was done range in complexity from a mere bar or yarn beam, over which the warp was hung, to a rude loom in which harness was employed to shift the warp. There were also battens with which to force home the weft. In the Central American and Peruvian weaving an additional shifting of warp was effected by simple mechanical devices. The llama furnished one of the finest staples in the world, and the delicate spindles found in ancient graves of Peruvian women show that the art of working in the wool of this animal had been highly developed.

The specimens shown in group 8 (Plate 53) are type forms of the pottery of the aborigines. This art flourished among the more cultured, sedentary tribes and was unknown, or but crudely practiced, in the far north and south, and where nomadic life was the rule. The mound-building people of the Mississippi Valley, and various tribes in the southern States farther east, were skilful potters, fashioning varied and artistic forms and excelling in the simpler modes of decoration. The Pueblo peoples of the arid Southwest were, and still are, expert potters, but the art was carried to its highest stage by the more cultured nations of Mexico, Central and South America. Pottery was manufactured mainly for domestic uses, but ceremonial purposes were also subserved. The strong native love of symbolism led to most varied and elaborate utilization of life forms, both in modeling and in surface decoration. The wheel as a means of throwing forms was unknown, and the art of glazing had not been discovered.

The ninth exhibit (Plate 54) shows in brief how far the aboriginal tribes of the Western Hemisphere had progressed in sculpture, or

the representation of natural forms in stone, wood, bone, etc., in the round or in relief. In the extreme North, beyond the limit of tree growth, drift-wood and walrus ivory were and are the materials used. On the north Pacific coast horn, slate, and wood are utilized to excellent advantage, but in other regions the art is not extensively practiced at the present time. Formerly many of the American tribes excelled in carving, especially in stone, which material was shaped to represent man, animals, and fanciful creatures in endless variety. The inspiration for this work was furnished by the religious symbolism of the people. Statuary as a purely aesthetic art was unknown to the aborigines, and they had not advanced to the stage where accurate portraiture was appreciated.

Shaping implements were made of stone, copper, bone, wood, etc. The hammer stone served for breaking, flaking, and pecking, the saw for dividing, the drill for boring, the grinding stone for shaping and smoothing, and the knife and chisel for cutting.

The tenth exhibit (Plate 55) shows how, throughout the entire American continent, adornment of the person gathers its materials from the most beautiful and durable of the native products. The necklace is worn always for jewelry, and is made up of those objects which are considered precious in their several localities. In the Arctic province it is ivory, bone, and wood; on the Pacific coast, dentalium, abalone, and other shells; in the interior basin, the seeds of plants; in the tropical regions, teeth of animals, wings of insects, feathers of birds; and in the Straits of Magellan, where the Fuegian tribes can scarcely be said to wear clothing, they gather the pretty little shells from the beach and string them on thongs of sinew for the adornment of the person. In the codices and sculptures of the more cultivated races this same passion for adorning the neck and breast is exhibited, but with them stone of rare colors and varieties, and copper, silver, and gold were in favor.

In the eleventh series (Plate 56) is assembled a collection of apparatus illustrating smoking and snuffing customs of the aborigines of America. Instead of being counted luxuries, the customs connected with these practices were associated with their civil, military, and religious life. In aboriginal times these practices were not universal throughout the Western Hemisphere; they were more in vogue in North and Central America than in South America. The western Eskimo pipes show Asiatic influence. Mackenzie says that the Athapascan tribes did not know the use of tobacco; but the forms of pipes found in various regions of North America are so highly specialized and so intimately associated with other classes of antiquities, assuredly pre-Columbian, that we must conclude that the tobacco pipe was of native origin. Stone was a favorite material for its manufacture,

but wood, bone, and pottery were in common use. The exhibit will convey a good idea of the range of form and material, and of the geographical distribution.

In a limited manner the specimens in the twelfth group (Plate 57) illustrate the attempts of the aboriginal Americans to record their thoughts in symbols. Save in the making of calendars the art of expressing concrete thoughts in syllabic or phonetic symbols had not been reached anywhere, even among the barbaric tribes of Mexico, Central America, and Peru. Writing was by means of pictures, parts of pictures, and rebuses. The Eskimo etched long prompters for stories on ivory, the forest tribes carved them on wood or scratched them on bark, the Plains Indians painted them on robes, while the Mexicans and Mayans sculptured them in stone or painted them on codices of native paper. The originals of the writings, called codices, were painted on cotton cloth, skins, or paper made from the maguey plant, by native artists, long before the conquest by Spain. They contain histories, genealogical tables, tribute rolls, land titles, laws, calendars, and minute instructions concerning matters of religion. Hundreds of them were ruthlessly destroyed by the Spaniards, but a few were preserved and are now kept with strictest care in the great libraries of Europe. By the munificence of His Excellency, Duke de Loubat, copies of existing specimens are being made in the highest style of modern reproduction, so that scholars may have the opportunity of studying them. In this exhibit will be seen facsimilies of the Codex Vaticanus, 3773, and the Codex de Rios, now in the Vatican Library; Codex Cospianus, library of the University of Bologna; and Codex Borbonicus, in the Palais Bourbon, Paris.

The thirteenth exhibit is designed to show the distribution of time-marking musical devices among the aboriginal Americans. There was entire absence of attempts at harmonies among the native tribes of the Western Hemisphere. Their melodic scale has not been determined. No mention of stringed musical instruments is found in any early writer, and all such found in the hands of Indians now are of foreign patterns. The whistle, the flageolet, and the simple conch-shell horn were in vogue in many places, but the universal musical instrument was for rhythm alone, in the form of the drum or the rattle. The Eskimo made his time-marking instrument of skin, the West Coast tribes of wood, the Indians of the plains of hoofs of animals, the Pueblo Indians of gourds, the coast tribes of shells, those of British Columbia of wood and basketry. In each region the time-keeper found some natural object ready at hand to do him service.

EXHIBITS REPRESENTING THE ART COLLECTIONS.

Distinct from the above groups of ethnological material are two series of exhibits representing the art collections of the Smithsonian

Institution and installed with the special exhibit of the Institution. They are (1) engravings of twenty-four masterpieces of portraiture; and (2) reproductions of twenty-four masterpieces of landscape and figure painting.

In addition to the exhibits displayed in the systematic series along with the other National Museum exhibits in the Government building, the following exhibits were prepared for other departments of the Exposition and lent to them during the continuance of the fair:

1. Series of trephined skulls from Peru, lent to the Division of Ethnology and Archaeology of the Exposition.

2. Ten plaster busts of American Indians and Eskimo, lent to the Division of Ethnology and Archaeology of the Exposition.

3. Series of casts of type forms of Indian stone implements, lent to the Division of Ethnology and Archaeology of the Exposition.

4. Two lay figures of Sioux Indians, lent to the Indian Office Exhibit, Interior Department.

5. Lay figure of a Filipino girl, weaving at a loom, lent to the Government Commission of the Exposition and installed in the Philippine exhibit, Government Building.

It is not assumed that the exhibits described in the preceding pages are completed. They are merely such as could be assembled, on the plan adopted, within the six months allowed for the work. Many changes and additions will be made when they are finally set up in the National Museum. The lay figure groups will be enlarged to a uniform size, a series of casts illustrating physical types of the people will be added, pictures will aid in completing the exhibit, and several new series of objects will serve to widen the field covered.

It is confidently expected that the completed exhibit will come more nearly bringing within reach of the average person a full conception of the native American race and its culture than any assemblage of museum material yet made.

Credit is due to a number of collaborators in the preparation of this exhibit, to Prof. O. T. Mason, curator of ethnology, for his energy in selecting and arranging the ethnological material and in the preparation of the series of labels, embodied largely in the present text; and to Dr. Walter Hough, assistant ethnologist; to T. W. Sweeny for competent service in arranging and mounting the several series of artifacts; to C. R. Luscombe, modeler of the dwelling groups; to Frank Lemon, H. J. Ellicott, and U. S. J. Dunbar, sculptors, for skilful work in modeling the life-size figures; to Mrs. Kate C. Holmes for lifelike coloration of the figures; to H. W. Hendley and C. E. Johnson, builders of the lay figures, and especially to Mr. Hendley for valued aid in setting up the groups.

I was fortunate in securing a set of views of the lay figure groups and of nearly all the other exhibits. The work was done by two of

our foremost photographers, Mr. T. W. Smillie, photographer of the Smithsonian Institution and National Museum, and Miss Frances B. Johnston, an artist of international reputation. The difficulties in the case were very great. The exhibits were installed in the darkest section of the Government building, and owing to the interference of timbers and drapery were very unevenly lighted. The glass fronts of the cases were so inserted that they could not be removed, and the reflections proved extremely troublesome. Selecting a Sunday morning for the work, we avoided the crowds that filled the building during the week days. Two sheets of dark cloth were secured, each about 14 feet square, and while one of these was tacked over the back of the case as a background for the group, the other, held by two men on step-ladders behind the camera, served to prevent reflections in the glass. The woodwork of the cases interfered somewhat with the view in several cases, but by painting out and retouching the parts have been restored, and a reasonably uniform result has been secured.

It may be noted that at the time of the handing in of this paper the exhibit is on view, about one-half in the Charleston Exposition and the remainder in the halls of the National Museum.

THE EXHIBIT MADE BY THE DEPARTMENT OF GEOLOGY.

By GEORGE P. MERRILL,
Head Curator.

The exhibit made by the Department of Geology at Buffalo was directly in line with that in the Museum at Washington, differing only in that special series were selected which seemed best suited to the purpose, when the place, time, character of the Exposition, and limited amount of space (1,520 sq. ft.) were taken into consideration. (See Plates 58 and 59.)

The work of preparation was begun early in the year and continued until the installation was completed at Buffalo on May 1. While by no means the entire force of the Department was thus occupied, nevertheless, the matter was always uppermost and interfered seriously with the ordinary routine work of the Museum.

An attempt was made to procure for the Exposition a fairly complete skeleton of a mastodon, and Messrs. Lucas and Stewart made several excursions for the purpose of investigating reported finds of such remains; but the results were in all cases unsatisfactory. As will be noted later, however, a small series of more or less fragmentary material was obtained.

Through a joint arrangement with the United States Geological Survey, sufficient funds were obtained for a model of a skeleton of *Triceratops prorsus*, the work of preparation of which occupied one preparator

and one or more modelers, besides the attention of the curator of the section, for a large part of the time until the final installation at Buffalo.

The details of the exhibits of the various divisions are given below. No exhibit was made by the section of paleobotany.

I.—DIVISION OF GEOLOGY.

The exhibit for the Division of Geology proper comprised five wall and one special case, four of the wall cases being occupied by cave, hot-spring, and geyser deposits, concretions, and silicified woods. One case was set aside for an exhibit of the rocks of the Hawaiian Islands, the recent annexation of which rendered a special exhibit at this time appropriate. The following transcript of the label which accompanied this last collection is sufficiently descriptive for present purposes:

ROCKS FROM THE HAWAIIAN ISLANDS.

The Hawaiian Islands are eight in number, lying near the north tropic between the parallels of latitude 19° and $22\frac{1}{2}^{\circ}$. They are of volcanic origin, but volcanic activity has ceased on all except the island of Hawaii, the largest and most southern of the group. The rocks of the islands are therefore all of an igneous nature, with the exception of the limestones of the coral reefs which were formed along the shores. The collection here shown consists of a series of specimens collected mainly from the islands Oahu and Hawaii by members of the Wilkes Exploring Expedition in 1840, by A. B. Lyons in 1892, and Prof. C. H. Hitchcock in 1899. It is intended to show the characteristic forms of the lavas and the ordinary rock types, as well as the soils resulting from their decomposition.

Perhaps the most unique exhibit pertaining to this division was a collection of such of the elements, exclusive of the gaseous forms, as are found in an uncombined or free state in nature. The transcript of the general label for this exhibit is given below:

THE NATIVE ELEMENTS.

Of the seventy-two known elements, there are, with the exception of certain gaseous forms, but sixteen which have thus far been found in the earth's crust in a native or uncombined state. These sixteen are as follows:

1. Carbon.	9. Silver.
2. Sulphur.	10. Copper.
3. Selenium.	11. Lead.
4. Tellurium.	12. Mercury.
5. Arsenic.	13. Platinum.
6. Antimony.	14. Iridium } Iridosmine.
7. Bismuth.	15. Osmium }
8. Gold.	16. Iron.

So far as possible these are shown in the accompanying collection. Iridium and osmium are shown only in the form of the natural alloy iridosmine, and selenium as selen-sulphur. Lead occurs native in but minute quantities. Palladium has been reported native, but is extremely rare.

The most striking of the objects here brought together were a small but very perfect octahedral crystal of a diamond from South Africa; a fine large mass of native arsenic from the Hartz Mountains, Germany; a like mass of antimony from New Brunswick; beautiful examples of wire and moss gold from California; branching crystals of silver and copper from the Lake Superior mines; thin films of native lead from Sweden; tellurium from Nevada; iridosmine from the Pacific coast of Oregon; native iron from Greenland, and a fine water-worn nugget of platinum weighing 444 grams from the Nijni Tagilsk district, Russia.

There was also a case of striking concretionary forms, including examples of the so-called "kugel" or orbicular granites from Sweden, Finland, and Rhode Island, and of the septarian concretions of clay ironstone from Weymouth, England; New York; Kansas, and other localities. Examples of the individual specimens are shown on Plates 60 and 61.

II.—DIVISION OF MINERALOGY.

The exhibit of the Division of Mineralogy was arranged with the following objects in view: To make as attractive a display as possible with the material and space available; to illustrate methods of arrangement and installation used by the division; to be self-explanatory and complete in itself. In the carrying out of this a systematic arrangement of minerals was planned which should show specimens of the more important minerals and their arrangement in accordance with the general scheme of classification, as outlined in the label, a transcript of which is given below:

A SYSTEMATIC ARRANGEMENT OF MINERALS.

The chemical composition of the mineral determines its position in the several classes. These classes, which are arranged in accordance with certain chemical laws having the periodic arrangement of the elements as a basis, are made up of those minerals having the same dominant negative chemical radical from which the class name is derived, as sulphide, silicate, etc. The whole is divided into two general groups—native elements and compounds of the elements. The compounds of the elements are further divided and grouped under certain classes according to, and which take their names from, their more negative constituents, as follows: Compounds of the halogens, fluorides, chlorides, bromides, and iodides. Compounds of sulphur, selenium, and tellurium; also arsenic and antimony, including sulphides, selenides, and tellurides; arsenides, antimonides, sulpharsenides, and sulphantimonides; also sulphosalts. Oxygen compounds, including oxides and the oxygen salts, borates, aluminates, chromites, ferrites, manganites, plumbates, arsenites and antimonites, selenites and tellurites, carbonates, silicates, titanates, columbates and tantalates, nitrates, vanadates, phosphates, arsenates and antimonates, sulphates, selenates and tellurates, chromates, molybdates and tungstates, iodates, and uranates. Compounds of organic origin, including salts of organic acids and carbon compounds.

Each of these classes was preceded by a general label giving a short statement of its more important chemical characters, as illustrated by the following example:

CLASS—SILICATES.

The silicates, derivatives of the several silicic acids H_4SiO_4 , H_2SiO_3 , $\text{H}_6\text{Si}_2\text{O}_7$, $\text{H}_2\text{Si}_2\text{O}_5$, and $\text{H}_4\text{Si}_3\text{O}_8$, or compounds of silicon oxide with other oxides, constitute about nine-tenths of the known crust of the earth and more than one-fourth of the known kinds of minerals. Isomorphic combinations are the rule, and the class exhibits great diversity of composition. For example, the ratio of oxygen in silica to that in combined oxide may vary for monad and dyad elements, such as potassium or calcium, between 2:4 and 4:1; and for silicates of triad elements, such as aluminum or iron, between 2:6 and 12:3. Again, it is not unusual to find a silicate containing both potassium and calcium, or the oxides of iron and aluminum, or of calcium and aluminum, and that not necessarily in atomic proportion. But although certain oxides are capable of mutual replacement in any and all proportions, such as the sesquioxide of iron or aluminum, or the monoxide of calcium, magnesium, iron, manganese, sodium, or lithium; and though a silicate may contain at once a mixture of sesquioxides and monoxides in combination with silica, the place of a monoxide is not taken by a sesquioxide, nor that of a sesquioxide by a monoxide.

Following the class label, arranged in order from left to right, were placed the several members of the class, selected to illustrate as completely as possible their occurrences, associations, and variety in form and color. Each specimen was mounted on a block and accompanied by a small label giving the name of the mineral, its associations, if any, and its locality.

Conspicuous among the several classes were the fluorides, carbonates, silicates, and chromates, the individuals comprising them being especially notable for their beauty and vivid coloring. Among the fluorides were shown a magnificent series of German, English, and American fluors having an extensive color range, including white, yellow, green, violet, sky, and amethystine blue, rose red, and lilac. Among the carbonates were the minerals malachite and azurite, the former bright green in color, the latter a fine Berlin blue. In addition a botryoidal mass of these two minerals was shown in which the malachite and azurite are in alternate concentric layers, giving rise to a strong and pleasing contrast of color.

The display feature was well developed in the class silicates where the green of microcline was contrasted with the rich blue of sodalite. Among the tourmalines was shown the cross section of a crystal red internally, passing into a lighter hue, and finally green; there was also a fine mass of California rubellite of a delicate pink color on a ground-mass of lilac-colored lepidolite. Play of color was well illustrated by a fine cleavage mass of labradorite from Isle of Paul, in which blue and green predominate.

The series as a whole comprised some 500 specimens and 47 group labels installed in 4 slope-top cases, as shown in Plates 58 and 59.

III.—DIVISION OF STRATIGRAPHIC PALEONTOLOGY.

A. SECTION OF INVERTEBRATE FOSSILS.

The exhibit of the section of invertebrate fossils formed two series comprising the more interesting crinoids and cephalopods, the first being illustrated by 94 and the second by 156 genera. The object of the collections was to illustrate by specimens and descriptive labels the anatomy and generic characters of the hard parts of these animals as known to paleontologists, and incidentally to illustrate the methods of installation practiced in this section.

Each series began with an introductory label defining the essential characters of each class of organisms. As many technical words were involved in the description, a second series of labels was prepared, in which the terms were defined and which were accompanied by specimens on which the parts referred to were artificially colored. As it may be desirable to build up similar series for other exhibits, sometime in the future, the transcript of the introductory and explanatory labels is given below. Plates 62-69 show the character of the material comprised in the crinoid series.

This exhibit was comprised in the five screen cases indistinctly shown at the left in Plate 58.

INTRODUCTORY LABEL.

CLASS CRINOIDEA.

Crinoids, or sea lilies or stone lilies, are marine animals related to the starfishes, and like them have in the outer integument a skeleton of calcareous ossicles. A normal crinoid consists of a *crown* attached by its dorsal or aboral extremity to a *stem*, which is fixed to the sea floor or to some solid body by a *root*. They are gregarious, locally restricted, animals, have existed since Cambrian time, and live in the seas, ranging from shallow water down to about 3 miles beneath the ocean surface. In Paleozoic time they had greatest development, and their separated ossicles occasionally form beds of limestone of considerable thickness. In the Carboniferous rocks of the Mississippi Valley crinoids are often well preserved and good crowns are not rare. More than 300 species are known from the vicinity of Burlington, Iowa.

The crinoids, from a phylogenetic standpoint, are divided into the subclasses Monocyclica and Dicyclica, and these divisions are again separated into six orders, five suborders, and two grades, all of which are here illustrated by specimens. Of recognized genera there are upward of 240.

SPECIAL EXPLANATORY LABELS.

THE CROWN.

(See Plate 62.)

The crown consists of the *dorsal cup* or shortly *cup* (colored blue), the *tegmen*, sometimes called disk or vault (red), and the *brachia* or arms (yellow), which are generally provided with *pinnules* (black), and often there is an *anal tube* (brown).

24185. *Platycrinus hemisphericus*. Lower Carbonic.

24191. *Cyathocrinus multibrachiatus*. Lower Carbonic.

24163. *Batoecrinus wachsmuthi*. Lower Carbonic. The brachia are removed to show the tegmen and anal tube.

THE DORSAL CUP.

(See Plate 63.)

The dorsal cup in its simplest form is composed of two or three circlets of five plates, those in one circlet alternating with the five in the adjacent circlet. Of these the most important are those that support the brachia, and to them the term *radials* is restricted (colored blue). The interradial plates below these are the *basals* (colored red), so called because in many crinoids they form the base of the cup and rest on the stem. Such crinoids are called *monocyclic*. In other crinoids a circlet of *infrabasals* occurs beneath the basals (colored yellow), and these, therefore, are known as *dicyclic*.

Primarily there are five plates in each circlet; but owing to the fusion of two or more of the proximal plates the number of basals in monocyclic forms may be reduced to four, three, or even two, and the infrabasals in dicyclic crinoids to three.

The cup often has, in addition to the plates above described, supplementary plates known as "*anals*" and "*interbrachials*," which assist in enlarging the cup.

776. *Batocrinus longirostris*. Lower Carbonic. The cup plates not colored are the *interbrachials*.

7519. *Platycrinus planus*. Lower Carbonic.

24191. *Cyathocrinus multibrachiatus*. Lower Carbonic.

THE TEGMEN.

(See Plate 64.)

The tegmen in its simplest form is composed of five plates called *deltoids* or *orals* (colored red). There are nearly always present also *ambulacrals* (colored blue) covering the food grooves or ambulacra that lead from the brachia to the mouth. In many Paleozoic genera the ambulacral plates are covered by the *interradial dome plates* (colored yellow). When the dorsal cup is enlarged by other plates than those of a simple crinoid, the tegmen also introduces supplementary plates known as *interambulacrals* (black). Finally the tegmen may be in the form of a coriaceous skin, in which large numbers of thin calcareous ossicles are embedded.

The mouth is nearly always covered by the deltoids or the dome plates, while the *anus*, which is closed by a *valcular pyramid*, is often surrounded by or raised on small plates (colored brown).

24,185. *Platycrinus hemisphericus*. Lower Carbonic.

768. *Dorycrinus unicornis*. Lower Carbonic. The anal pyramid is not preserved.

775. *Batocrinus elegans*. Lower Carbonic. The anal tube is broken away.

24,413. *Strotocrinus regalis*. Lower Carbonic. A natural cast of the interior surface of the tegmen showing the ambulacral grooves.

THE BRACHIA AND PINNULES.

(See Plate 65.)

The brachia or arms in their simplest form consist of a series of ossicles called *brachials* (colored blue), which continue straight up from the *radials* (colored red). The brachials may be in single or alternating double rows, and hence are spoken of as *uniserial* or *biserial*. The inner surface of the brachia are grooved for the transmission of food-laden water to the mouth and for the soft parts; and these are protected by covering plates called *ambulacrals* (yellow), which can open or close as occasion demands.

The brachia are rarely single, usually bifurcating in a regular or irregular manner at definite points. The *pinnule* (colored black) is a brachium in miniature; it differs in nothing but position from the small end branches of a simple dichotomous arm. However, when the pinnules are regularly placed on alternate sides of successive brachials of the main branch the arm is said to be *pinnulate*. To these pinnules are restricted the fertile portions of the genital rachis.

- 24,193. *Scytalocrinus robustus*. Lower Carbonic. Brachia pinnulate with regular bifurcations. Brachials in single columns.
- 34,087. *Platycrinus agassizi*. Lower Carbonic. Brachia pinnulate with regular bifurcations. Brachials in double, alternating columns.
- 24,191. *Cyathocrinus multibrachiatus*. Lower Carbonic. Brachia dichotomous, without pinnules.
- 24,155. *Barycrinus hereules*. Lower Carbonic. Pinnulate brachia showing the ambulacral groove and ambulacral plates.

THE ANAL AREA.

(See Plate 66.)

In most crinoids there is inserted in an interradius one or more extra pieces called *anal plates* (colored red). The *anal tube* when present (colored blue) is supported by the anal plates. The *anal opening* (colored brown) may be in the side or at the apex of the tube.

- 26,771. *Cactocrinus ornatissimus*. Lower Carbonic. Showing the anal tube between the brachia.
- 24,192. *Scaphiocrinus unicus*. Lower Carbonic. Showing the anal tube with the anal opening in the side.
- 24,193. *Scytalocrinus robustus*. Lower Carbonic.
- 27,868. *Æsiocrinus magnificus*. Upper Carbonic. The brachia have been removed.

ENLARGEMENT OF THE SIMPLE DORSAL CUP.

(See Plate 63.)

The dorsal cup may be enlarged by the addition of *proximal brachials* (here colored blue) or by the insertion of a variable number of extra plates between the brachials. The latter are called *interbrachials* (colored red).

- 24,156. *Taxocrinus multibrachiatus*. Lower Carbonic.
- 24,163. *Batocrinus wachsmuthi*. Lower Carbonic.

THE STEM.

(See Plate 67.)

The flexible *stem* is composed of *stem ossicles*, which vary not only greatly in number in different crinoids, but often also in form in different parts of the same stem. It has a more or less large axial canal which serves to transmit vascular and nervous prolongations, and in the earlier forms may have served other purposes. The larger segments are called *nodal ossicles* (blue), and may bear *cirri* (red) at regular or irregular intervals throughout the whole length of the stem.

In some forms the stem is almost absent, the cup then cementing to solid objects. In *Pentacrinus* the stem attains a length of 18 feet. In rare cases the stem has no roots, but attaches by the cirri or by winding the stem around the object of attachment. In others it ends in a four-fluked grapple or in a bulb; finally, there are

forms without stems or anchoring structures. The latter are adapted to free locomotion either by swimming or by crawling about by the brachia.

- 24,887. Ordovician stems and stem ossicles. St. Paul, Minn.
- 15,518. Stem of *Glyptocrinus*. Winding around foreign object. Upper Ordovician.
- 34,091. Upper Silurian stem and stem ossicles. Dayton, Ohio.
- 26,468. *Myrtillocrinus bulbosus*. Middle Devonian. Stem ending in a four-fluked grapple.
- 34,086. Stem and ossicles of *Platycrinus*. Lower Carbonic. The spiral twist of the flattened stem enables the animal to turn in any direction.
- 34,092. Stem with cirri. Lower Carbonic.

ROOTS.

(See Plate 68.)

The roots are distal branches of the stem, and, like it, are usually made up of perforated ossicles. In some forms the stem terminates in a disk-shaped or encrusting nonsegmented root.

- 34,089. *Anomalocrinus incurvus*. Growing upon a monticuliporoid bryozoan. Upper Ordovician.
- 34,093. Root of *Ectenocrinus*(?). Upper Ordovician.
- 10,425. *Eucalyptocrinus crassus*. Upper Silurian.
- 34,088. *Poterioocrinus spartarius*. Lower Carbonic.

INJURIES.

Crinoids are found which during life had lost a considerable portion of the brachia. Such lost parts may be subsequently regrown and pass through the same growth stages as the adult.

The stems when fractured repair the broken place by profuse calcareous deposit, as shown by the annexed specimens.

CRINOID PARASITES.

(See Plate 69.)

Gastropods of the genera *Cyclonema* and *Platyceras* are found situated over the anal region of many crinoids. In the Silurian and Devonian such occurrences are rare and there do not appear to have been permanent parasites. In the Lower Carboniferous, however, the form of the shell is considerably modified and perfectly molded to the crinoid, proving that the *Platyceras* spent its life where found. Its sustenance, therefore, must have been largely the effete matter of the crinoid.

- 15,513. *Glyptocrinus decadactylus*. The parasite is *Cyclonema bilix*. Upper Ordovician.
- 26,465. *Arthracantha punctobrachiata*. The parasite is *Platyceras dumosum rarispinum*? Middle Devonian.
- 24,185. *Platycrinus hemisphericus*. Lower Carbonic. The parasite is *Platyceras unum*.

CRINOIDAL LIMESTONE.

Limestones are found, many feet in thickness, almost entirely made up of the disjointed skeletal parts of crinoids. Such limestones are usually of local occurrence, but in the region of Iowa and Missouri the Burlington crinoid limestone extends for more than 300 miles. This is the most extensive crinoid bed, having furnished between 300 and 400 species and many thousands of individuals.

- 15518. Upper Ordovician crinoidal limestone, from Madison, Ind.
- 34094. Lower Carbonic crinoidal limestone, from Burlington, Iowa.

Following the crinoids were shown the fossil cephalopods, with special reference to the ammonites. Here the testaceous anatomy is not so complicated as in the crinoids and requires fewer descriptive labels in the introductory series.

INTRODUCTORY LABEL.

CLASS CEPHALOPODA.

The pearly nautilus, squid, and cuttlefish are three types of living Cephalopods. These animals are restricted to marine waters, and are the most highly organized class of the Mollusca, a division of the animal kingdom, including, besides the Cephalopoda, the bivalve (clams, oysters), and univalve (drills, snails) shells.

The forms here shown are those having external chambered shells. They abounded in Paleozoic and Mesozoic seas. In the Tertiary seas the shelled Cephalopoda are restricted to a few forms very much like the living pearly nautilus of the Pacific Ocean. (See complete animal in jar, with alcohol.) The shell may be straight, curved, or coiled, and is divided at regular intervals by *septa*. The chambers thus formed are connected with the animal by a tube or *sipho*.

The shelled Cephalopods are divided into two orders, *Nautiloidea* and *Ammonoidea*. In the former the *sutures* (lines of junction of the *septa* with the outer shell) are usually straight or merely undulated, while in the latter they are more or less abundantly lobed and inflected, the greatest complexity having been attained during Mesozoic time. Of Nautiloids about 2,500 species are known, and of Ammonoids not less than 5,000. The latter died out during Mesozoic time. Some straight Nautiloidea grew to a length of more than 15 feet, while certain coiled Ammonoids have attained a diameter of 5 feet.

The classification here adopted is that of Hyatt, as published in Text Book of Paleontology, by Zittel and Eastman.

SPECIAL EXPLANATORY LABEL.

NAUTILUS POMPILIUS LINNÆUS.

(Shell with animal.)

South Seas, Pacific.

(*c*) *Hood*, serving to close the aperture of the shell when the animal is withdrawn into the living chamber.

(*d*) *Hyponome*, serving to conduct water by suction into the gill cavity of the mantle, from which it is then violently expelled, the reaction driving the creature backward.

(*t*) *Tentacles*, of which there are about ninety.

SEPTA AND SIPHO.

NAUTILUS MACROMPHALUS Sowerby.

New Caledonian sea.

The animal is removed and the shell sectioned to show the various parts, with the technical names applied directly to each part.

JAWS OF A NAUTILOID.

TEMNOCHEILUS BIDORSATUS Schlotheim.

(Conchorhynchus avirostris.)

TRIASSIC (MUSCHELKALK).

Wurzburg, Bavaria, Germany. 29104.

SUTURE.

CERATITES NODOSUS de Hamn.

TRIASSIC.

Goettingen, Germany. 4463.

A simple Ammonoid with the shell removed to show the suture line (colored red).

DEVELOPMENT OF THE NAUTILOIDEA.

(After Branco.)

Primordial chamber of *Orthoceras* from the Triassic of St. Cassian. Enlarged 18 diameters.

DEVELOPMENT OF THE NAUTILOIDEA.

(After Branco.)

1. Primordial, second, and third chambers of *Nautilus pompilius*. Enlarged 18 diameters.

2. Section of same to show the beginning of the *sipho*. Enlarged 25 diameters.

DEVELOPMENT OF THE AMMONOIDEA.

(After Branco.)

1. Primordial chamber of a goniatite (*Mimoceras compressus*), enlarged 60 diameters.

2. Primordial chamber and first volution of same, enlarged 60 diameters.

DEVELOPMENT OF THE AMMONOIDEA.

(After Branco.)

1. Primordial chamber of a latisellate Ammonoid (*Arcestes cymbiformis*), greatly enlarged. The term *latisellate* has reference to the suture (colored red) forming a decided broad *saddle* on the venter.

2. First volution of a latisellate Ammonoid.

DEVELOPMENT OF THE AMMONOIDEA.

(After Branco.)

1. Primordial chamber of an angustisellate Ammonoid (of the type of *Phylloceras heterophyllum*) enlarged 60 diameters.

2. Section through the primordial, second, and third chambers, to show the beginning of the *sipho* of an angustisellate Ammonoid. Enlarged 100 diameters.

DEVELOPMENT OF THE AMMONOIDEA.

(After Branco.)

1. Primordial chamber of an angustisellate Ammonoid (of the type of *Celoceras crassus*), enlarged 60 diameters. The term *angustisellate* has reference to the sutures (colored red) having prominent *ventral saddles*, with corresponding deep *lateral lobes*, and definite saddles at the umbilical depression.

2, 3. First and second volution of an angustisellate Ammonoid.

4. First three volutions, showing the introduction of sutural inflections and shell sculpture.

DEVELOPMENT OF THE AMMONOIDEA.

(After Branco.)

Section through the first and second volution of a latisellate Ammonoid (*Tropites*). It shows the beginning of the *sipho* in the cecal condition in the primordial cham-

ber and its transition from the dorsal to the ventral side; also the transition from the *monochaonic* (having only a funnel) to the later *cloiochaonic* (funnels lost, collars alone remaining) condition. Enlarged 60 diameters.

B. SECTION OF VERTEBRATE FOSSILS.

The exhibit of the section of vertebrate fossils comprised a series of specimens representing the Mastodon, Mammoth, and Titanotherium, reproductions of the skeletons of Zeuglodon and Triceratops, and a very complete mounted skeleton of the Cretaceous diving bird *Hesperornis regalis*. This last is of special importance, not only as being the first skeleton of this representative of the toothed birds to be mounted and exhibited, but because it threw new light on the structure and attitude of the bird. In ordinary swimming birds the legs are directed downward, beneath the body, but the character of the articulations show that in *Hesperornis* the tarsi were directed outward at right angles to the body. A photograph of the skeleton as exhibited is shown in Plate 70.

The skeleton of Zeuglodon was modeled from material obtained by Mr. Charles Schuchert in Alabama. It comprised practically a complete vertebral column, many of the ribs, a good skull containing the complete dentition, and the major portions of the fore and hind limbs. This is a greater amount of material than is present in any other museum, and made it possible for the first time to obtain an accurate idea of the skeleton of this animal. It is shown suspended from the ceiling in the background of Plate 59.

The skeleton of Triceratops was a full-sized reproduction based on the material in the United States National Museum, which contains portions of fifteen specimens. These include the skull, limbs, lacking phalanges, pelvis, nearly complete vertebral column in advance of the sacrum, and several ribs. The greater part of the skeleton was thus present and restoration was limited to some of the ribs and the greater portion of the caudal vertebræ. The reproduction of the skeleton provided the first accurate representation of one of these huge dinosaurs ever placed on exhibition. It is regretted that no more satisfactory view of this interesting restoration could have been obtained than that furnished in Plates 58 and 59. This exhibit was accompanied by a small model, some 18 inches in length, and a painting by Mr. Charles Knight, showing the animal as it was supposed to appear in life. See Plates 71 and 72.

The exhibit for the Division of Geology, it should be stated, was prepared under the direct supervision of the head curator; that of the Division of Mineralogy by Mr. Wirt Tassin, assistant curator; that of the Section of Invertebrate Fossils by Mr. Charles Schuchert, assistant curator, and that of the Section of Vertebrate Paleontology by Mr. F. A. Lucas, curator of comparative anatomy in charge collection of vertebrate fossils.

APPENDIX.

[PUBLIC—No. 184.]

AN ACT to encourage the holding of a Pan-American Exposition on the Niagara frontier, within the county of Erie or Niagara, in the State of New York, in the year nineteen hundred and one.

Whereas it is desirable to encourage the holding of a Pan-American Exposition on the Niagara frontier, within the county of Erie or Niagara, in the State of New York, in the year nineteen hundred and one, to fittingly illustrate the marvelous development of the Western Hemisphere during the nineteenth century, by a display of the arts, industries, manufactures, and products of the soil, mines, and sea; and

Whereas the proposed Pan-American Exposition, being confined to the Western Hemisphere, and being held in the near vicinity of the great Niagara cataract, within a day's journey of which reside forty million people, would unquestionably be of vast benefit to the commercial interests, not only of this country, but of the entire hemisphere, and should therefore have the sanction of the Congress of the United States; and

Whereas satisfactory assurances have already been given by the diplomatic representatives of Canada, Mexico, the Central and South American Republics, and most of the States of the United States that these countries and States will make unique, interesting, and instructive exhibits peculiarly illustrative of their material progress during the century about to close; and

Whereas no exposition of a similar character as that proposed has ever been held in the great State of New York; and

Whereas the Pan-American Exposition Company has undertaken to hold such exposition, beginning on the first day of May, nineteen hundred and one, and closing on the first day of November, nineteen hundred and one: Therefore,

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That all articles that shall be imported from foreign countries for the sole purpose of exhibition at said exposition upon which there shall be a tariff or customs duty shall be admitted free of payment of duty, customs fees, or charges, under such regulation as the Secretary of the Treasury shall prescribe; but it shall be lawful at any time during the exposition to sell for delivery at the close thereof any goods or property imported for or actually on exhibition in the exposition buildings, or on the grounds, subject to such regulation for the security of the revenue and for the collection of import duties as the Secretary of the Treasury shall prescribe: *Provided,* That all such articles when sold or withdrawn for consumption in the United States shall be subject to the duty, if any, imposed upon such articles by the revenue laws in force at the date of importation, and all penalties prescribed by law shall be applied and enforced against the persons who may be guilty of any illegal sale or withdrawal: *And provided further,* That all necessary expenses incurred in carrying out the provisions of this section, including salaries of customs officials in charge of imported articles, shall be paid to the Treasury of the United States by the Pan-American Exposition Company, under regulations to be prescribed by the Secretary of the Treasury.

SEC. 2. That there shall be exhibited at said exposition by the Government of the United States, from its Executive Departments, the Smithsonian Institution and

National Museum, the United States Commission of Fish and Fisheries, the Department of Labor, and the Bureau of the American Republics, such articles and material as illustrate the function and administrative faculty of the Government in time of peace, and its resources as a war power, and its relations to other American Republics, tending to demonstrate the nature of our institutions and their adaption to the wants of the people. And to secure a complete and harmonious arrangement of such Government exhibit, a board of management shall be created, to be charged with the selection, purchase, preparation, transportation, arrangement, safe-keeping, exhibition, and return of such articles and materials as the heads of the several Departments and the Secretary of the Smithsonian Institution, the Commissioner of Fish and Fisheries, the Commissioner of Labor, and the Director of the Bureau of the American Republics may respectively decide shall be embraced in said Government exhibit. The President may also designate additional articles for exhibition. Such board shall be composed of one person to be named by the head of each Executive Department, one by the head of the Smithsonian Institution and National Museum, one by the head of the United States Commission of Fish and Fisheries, one by the Commissioner of Labor, and one by the Director of the Bureau of the American Republics. The President shall name one of said persons so detailed as chairman, and the board itself shall appoint its secretary, disbursing officer, and such other officers as it may deem necessary. The members of said board of management, with other officers and employees of the Government who may be detailed to assist them, including officers of the Army and Navy, shall receive no compensation in addition to their regular salaries, but they shall be allowed their actual and necessary traveling expenses, together with a per diem in lieu of subsistence, to be fixed by the Secretary of the Treasury, while necessarily absent from their homes engaged upon the business of the board. Officers of the Army and Navy shall receive this allowance in lieu of the transportation and mileage now allowed. Any provision of law which may prohibit the detail of persons in the employ of the United States to other service than that which they customarily perform shall not apply to persons detailed for duty in connection with the Pan-American Exposition. Employees of the board not otherwise employed by the Government shall be entitled to such compensation as the board may determine. The disbursing officer shall give bond in the sum of twenty thousand dollars for the faithful performance of his duties, said bond to be approved by the Secretary of the Treasury. The Secretary of the Treasury shall advance to said officer, from time to time, under such regulations as the Secretary of the Treasury may prescribe, a sum of money from the appropriation for the Government exhibit, not exceeding at any one time three-fourths of the penalty of his bond, to enable him to pay the expenses of said exhibit as authorized by the board of management herein created.

SEC. 3. That the Secretary of the Treasury shall cause a suitable building or buildings to be erected on the site selected for the Pan-American Exposition for the Government exhibits from plans to be approved by the board, and he is hereby authorized and directed to contract therefor in the same manner and under the same regulations as for other public buildings of the United States; but the contract for said building or buildings shall not exceed the sum of two hundred thousand dollars, said sum being hereby appropriated for said purpose, out of any money in the Treasury not otherwise appropriated. The Secretary of the Treasury is authorized and required to dispose of such building or buildings, or the material composing the same, at the close of the exposition, giving preference to the city of Buffalo or to the said Pan-American Exposition Company to purchase the same at an appraised value, to be ascertained in such manner as may be determined by the Secretary of the Treasury.

SEC. 4. That the United States shall not be liable on account of said exposition for any expense incident to or growing out of same, except for the construction of the building or buildings hereinbefore provided for, and for the purpose of paying the

expense of selection, preparation, purchase, installation, transportation, care, custody, and safe return of exhibits by the Government, for the employment of proper persons as officers and assistants by the board of management created by this Act and for their expenses, and for the maintenance of the said building or buildings and other contingent expenses, to be approved by the chairman of the board of management, or, in the event of his absence or disability, by such other officer as the board may designate and the Secretary of the Treasury upon itemized accounts and vouchers; and the total cost of said building or buildings shall not exceed the sum of two hundred thousand dollars; nor shall the expenses of said Government exhibit for each and every purpose connected therewith, including transportation, exceed the sum of three hundred thousand dollars, amounting in all to not exceeding the sum of five hundred thousand dollars, which sum is hereby appropriated, out of any money in the Treasury not otherwise appropriated, the sum of five hundred thousand dollars, or so much thereof as may be necessary, to be disbursed by the board of management hereinbefore created, of which not exceeding the sum of ten thousand dollars shall be expended for clerical service: *Provided*, That no liability against the Government shall be incurred, and no expenditure of money under this Act shall be made, until the officers of said exposition shall have furnished the Secretary of the Treasury proofs to his satisfaction that there has been obtained by said exposition corporation subscriptions of stock in good faith, contributions, donations, or appropriations from all sources for the purposes of said exposition a sum aggregating not less than five hundred thousand dollars.

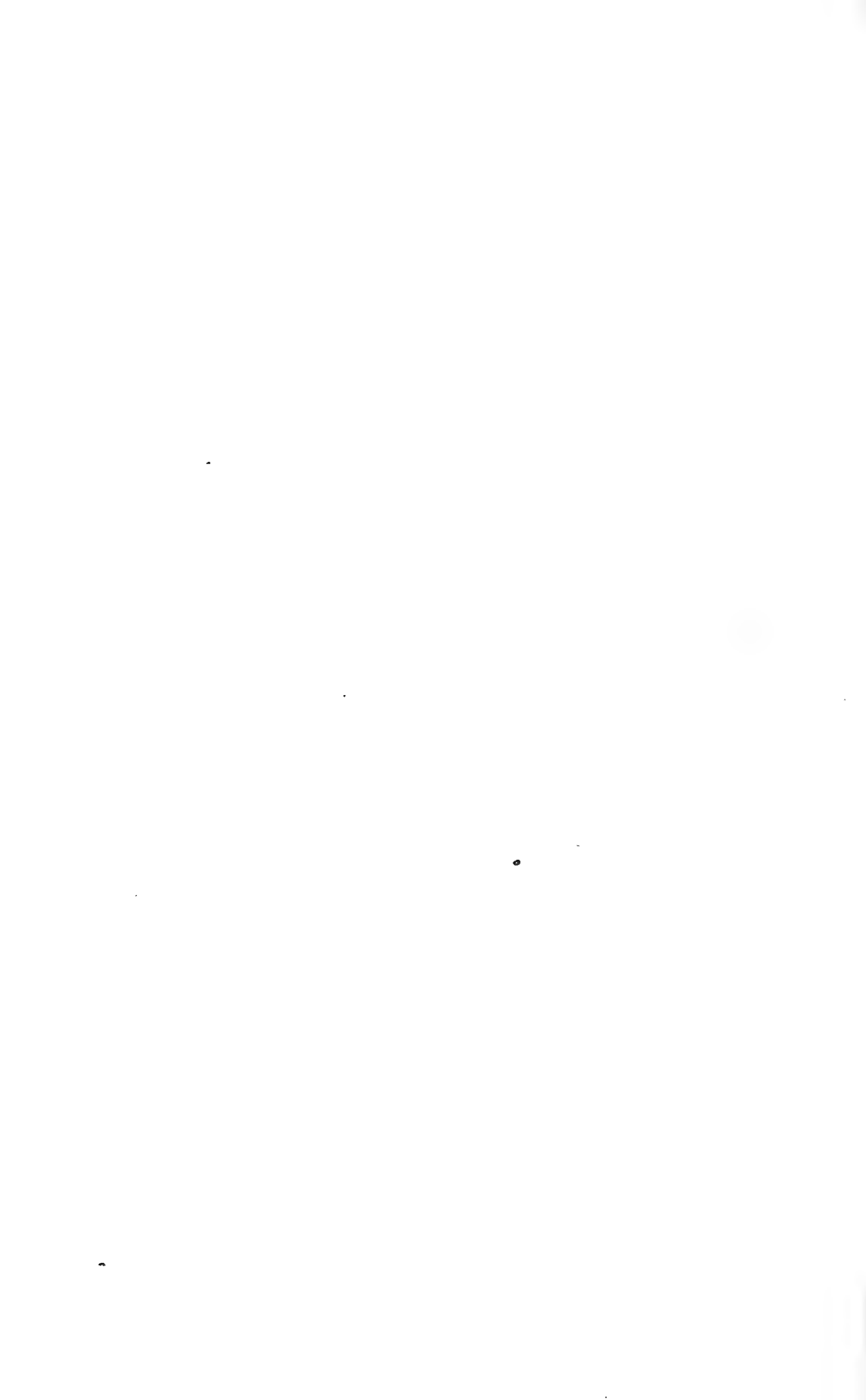
Sec. 5. That medals, with appropriate devices, emblems, and inscriptions commemorative of said Pan-American Exposition, and of the awards to be made to the exhibitors thereat, shall be prepared at some mint of the United States for the board of directors thereof, subject to the provisions of the fifty-second section of the coinage Act of eighteen hundred and ninety-three, upon the payment of a sum not less than the cost thereof; and all the provisions, whether penal or otherwise, of said coinage Act against the counterfeiting or imitating of coins of the United States shall apply to the medals struck and issued under this Act.

SEC. 6. That the United States shall not in any manner nor under any circumstances be liable for any of the acts, doings, proceedings, or representations of said Pan-American Exposition Association, its officers, agents, servants, or employees, or any of them, or for service, salaries, labor, or wages of said officers, agents, servants, or employees, or any of them, or for any subscriptions to the capital stock, or for any certificates of stock, bonds, mortgages, or obligations of any kind issued by said corporation, or for any debts, liabilities, or expenses of any kind whatever attending such corporation, or accruing by reason of the same.

SEC. 7. That nothing in this Act shall be so construed as to create any liability of the United States, direct or indirect, for any debt or obligation incurred, nor for any claim for aid or pecuniary assistance from Congress or the Treasury of the United States in support or liquidation of any debts or obligations created by said commission in excess of appropriations made by Congress therefor.

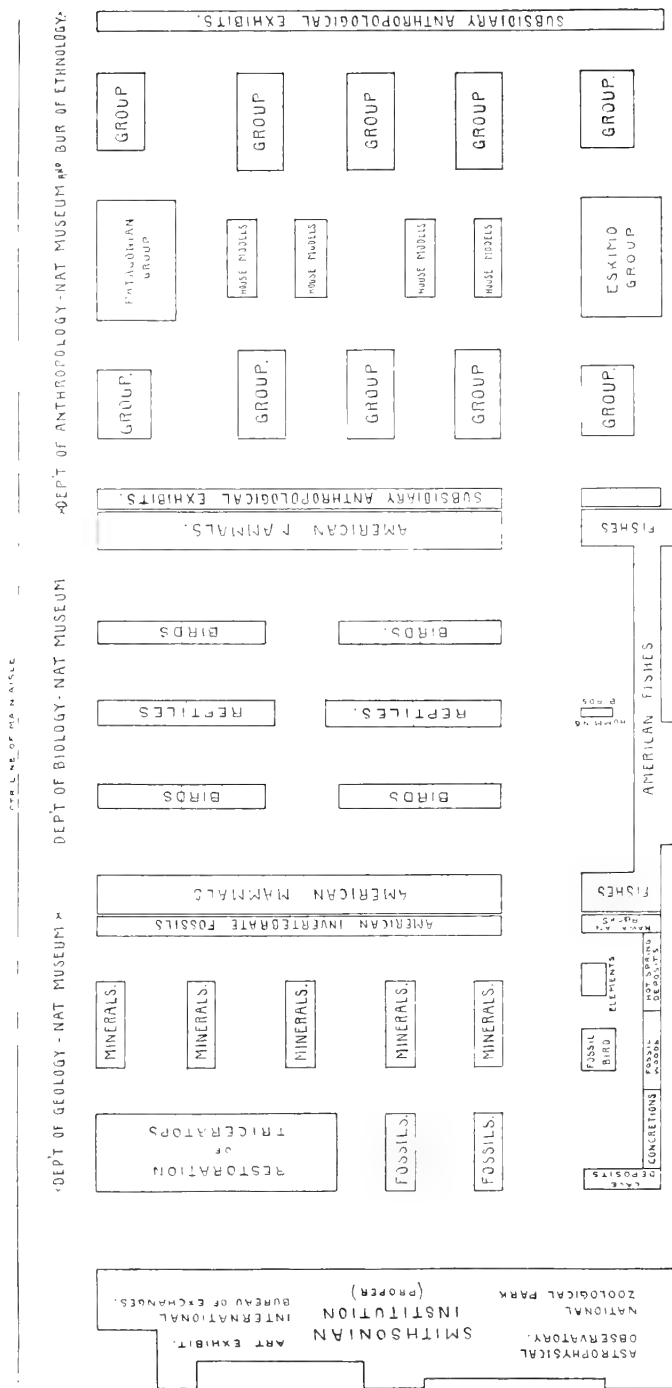
SEC. 8. That the appropriation herein made of five hundred thousand dollars in all shall take effect and become available immediately upon the passage of this Act.

Approved, March 3, 1899.





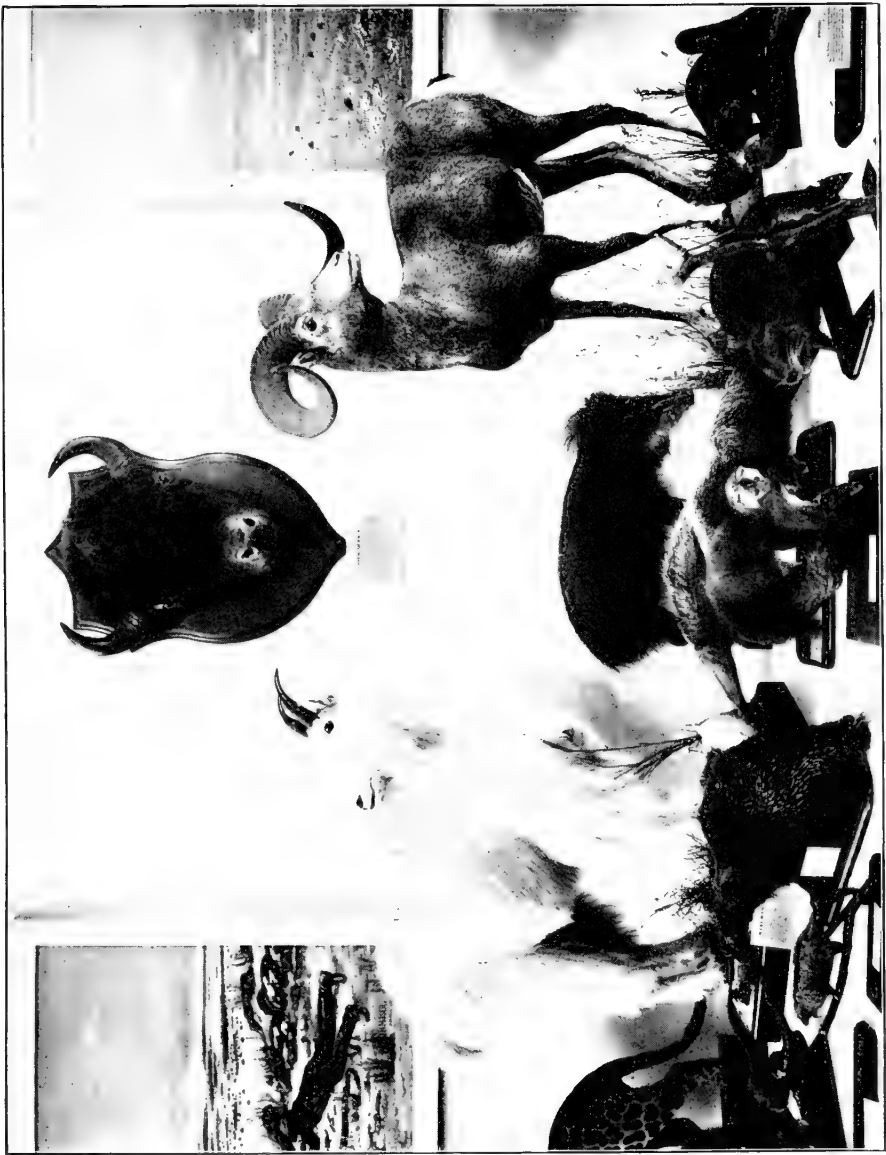
GENERAL VIEW OF U. S. NATIONAL MUSEUM EXHIBITS, PAN-AMERICAN EXPOSITION



FLOOR SPACE SMITHSONIAN INSTITUTION AND NATIONAL MUSEUM
PAN-AMERICAN EXPOSITION.



GENERAL VIEW OF EXHIBITS OF DEPARTMENT OF BIOLOGY.



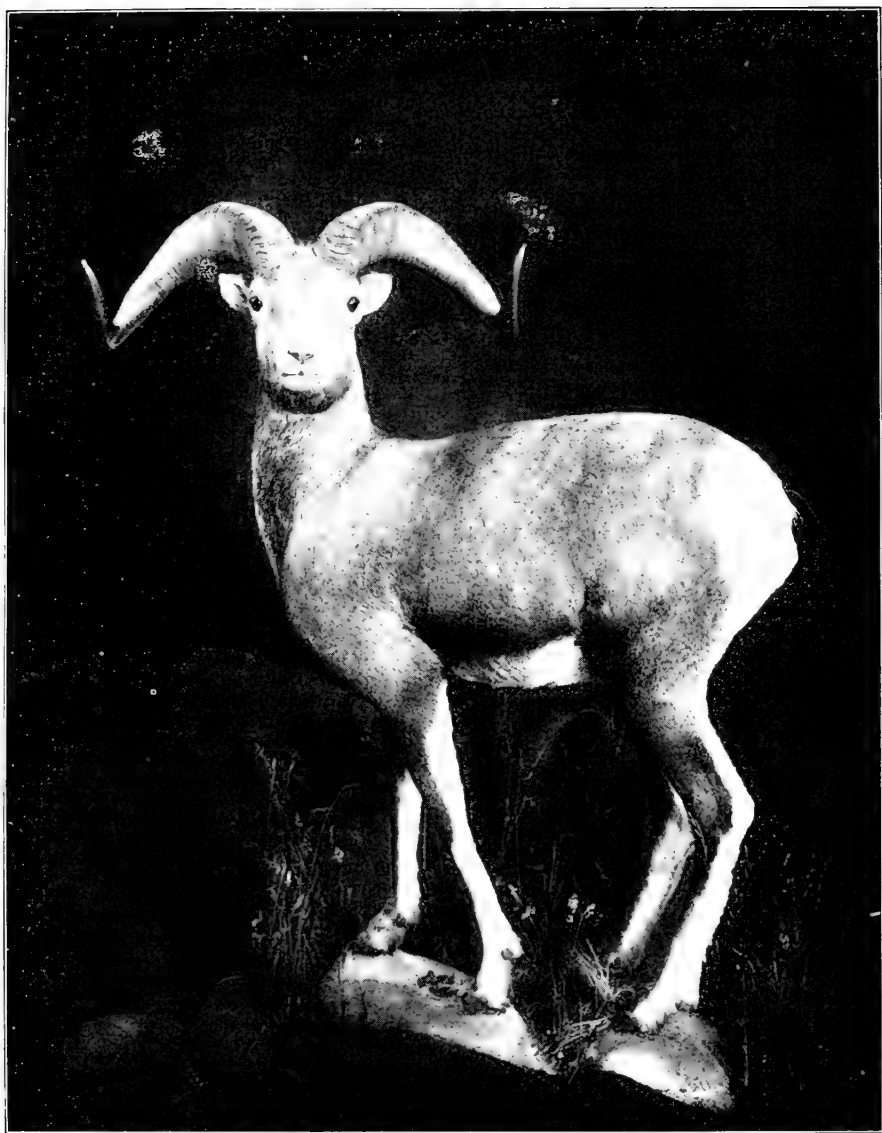
PART OF LARGE MAMMAL CASE.



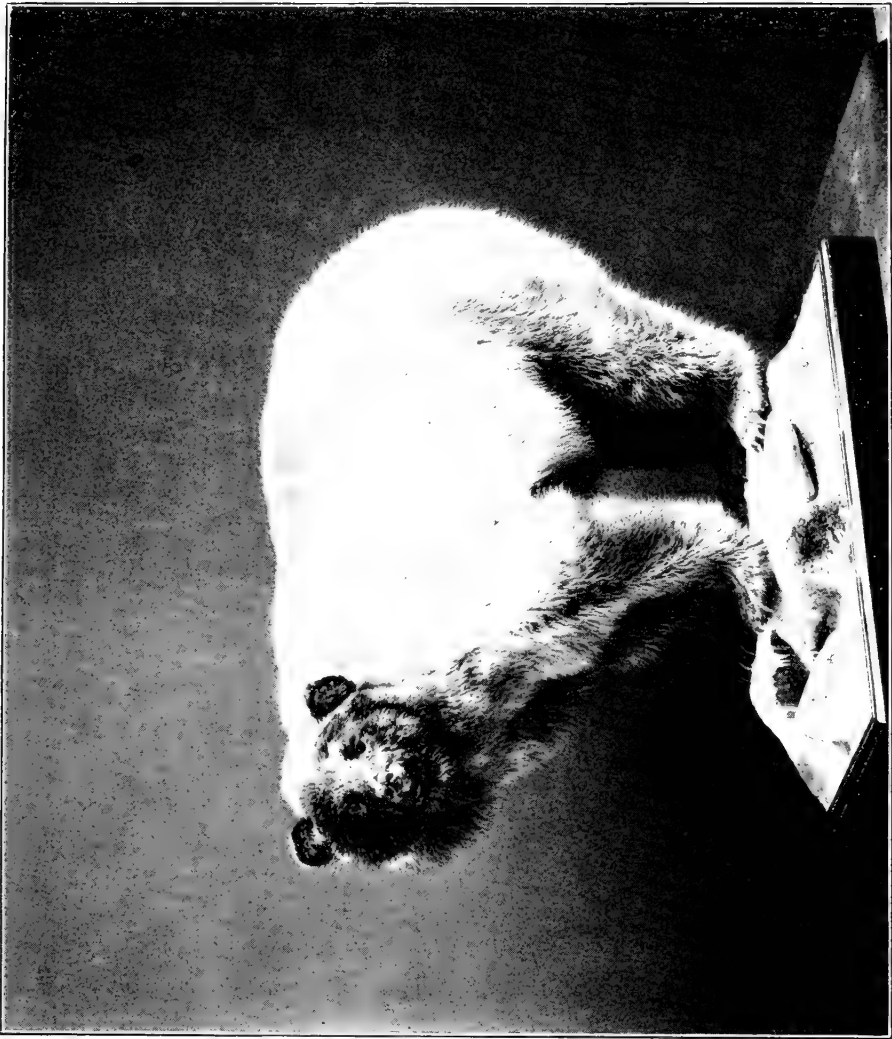
GENERAL VIEW OF EXHIBIT OF FISHES.



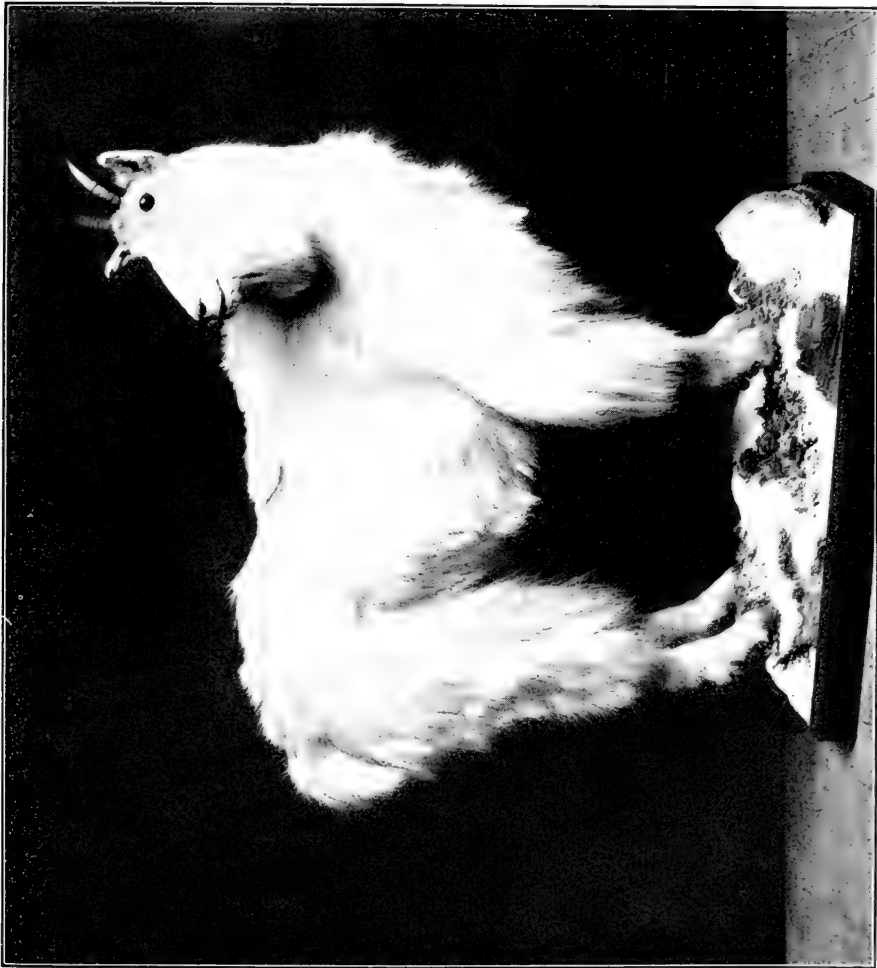
KADIAK BEAR.



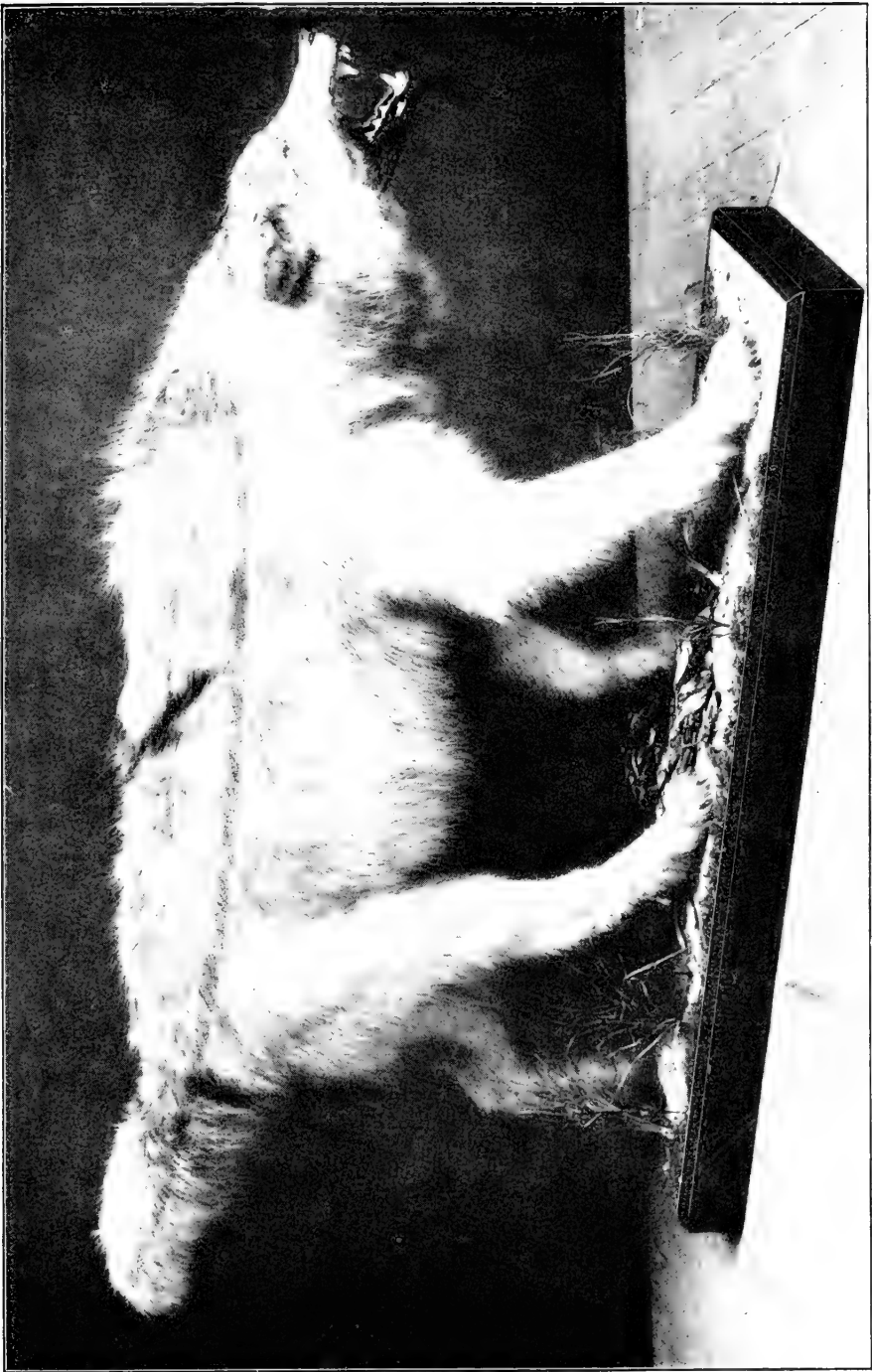
STONE'S SHEEP.



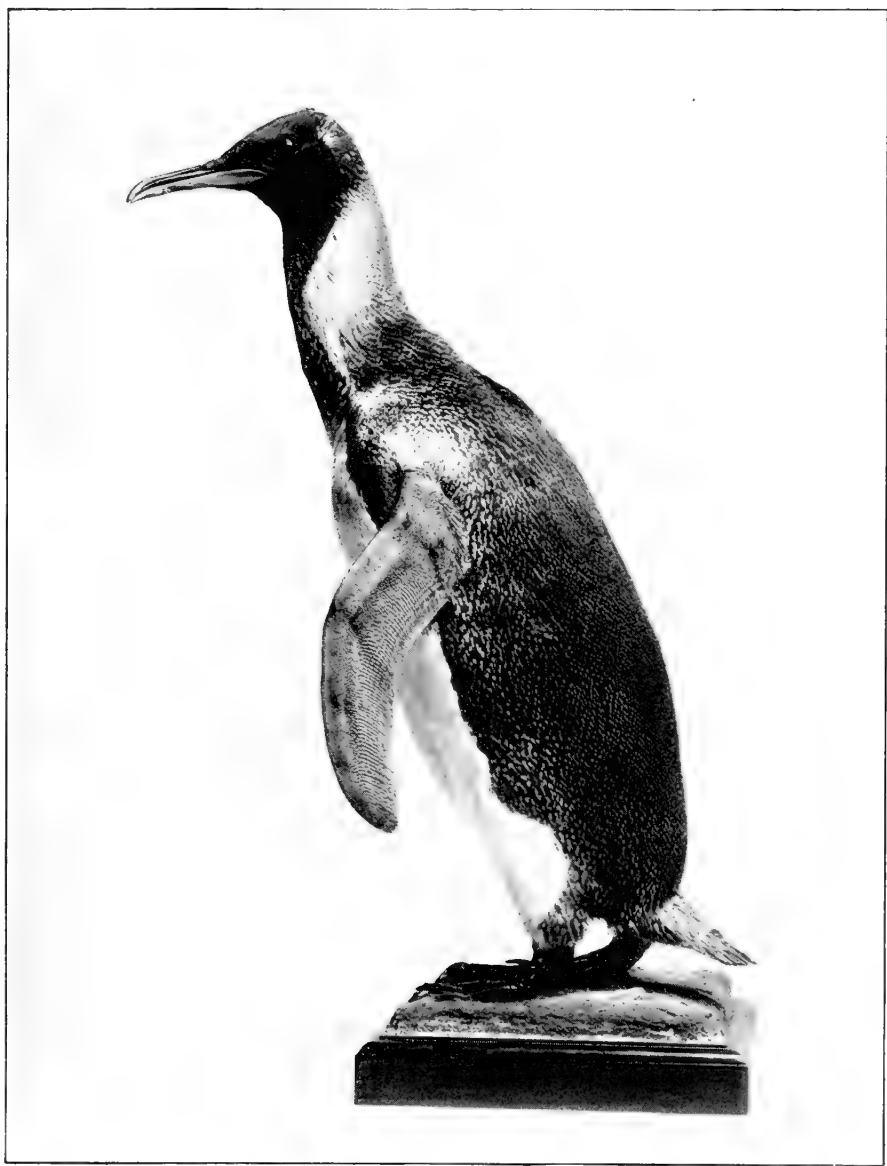
GLACIER BEAR.



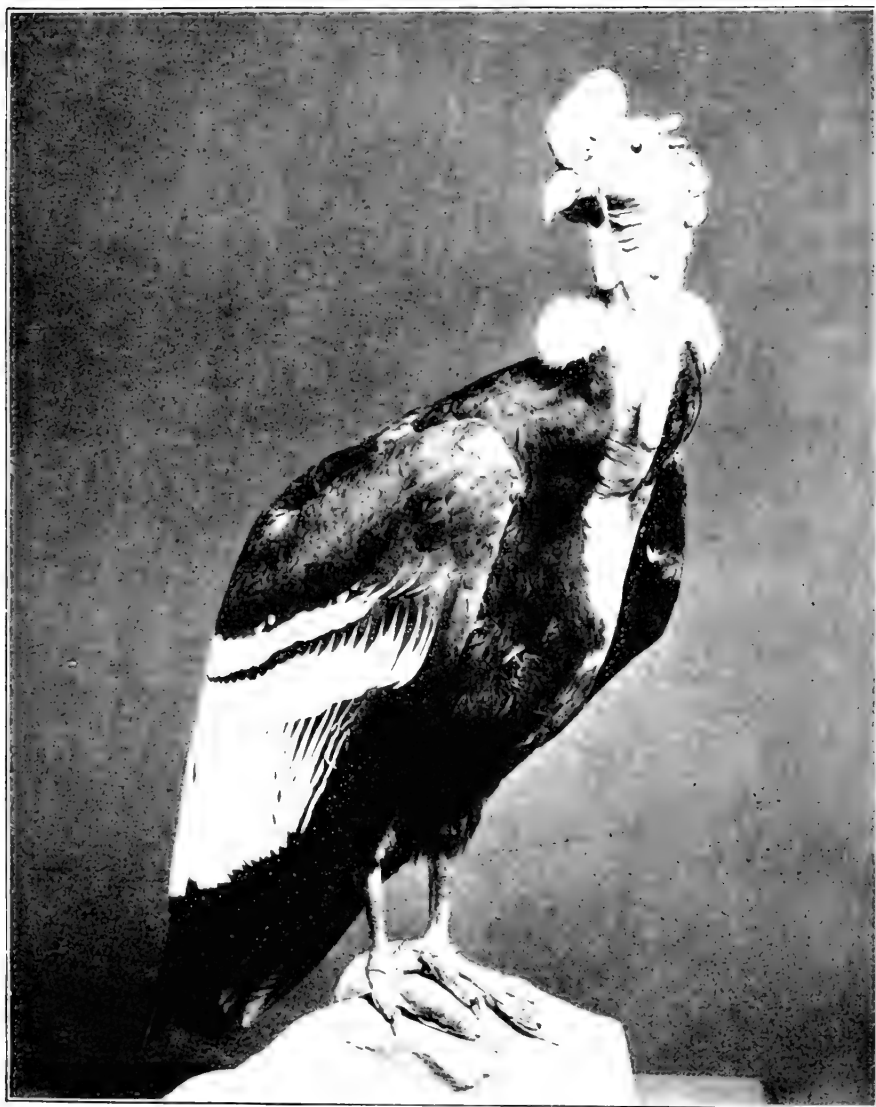
WHITE GOAT.



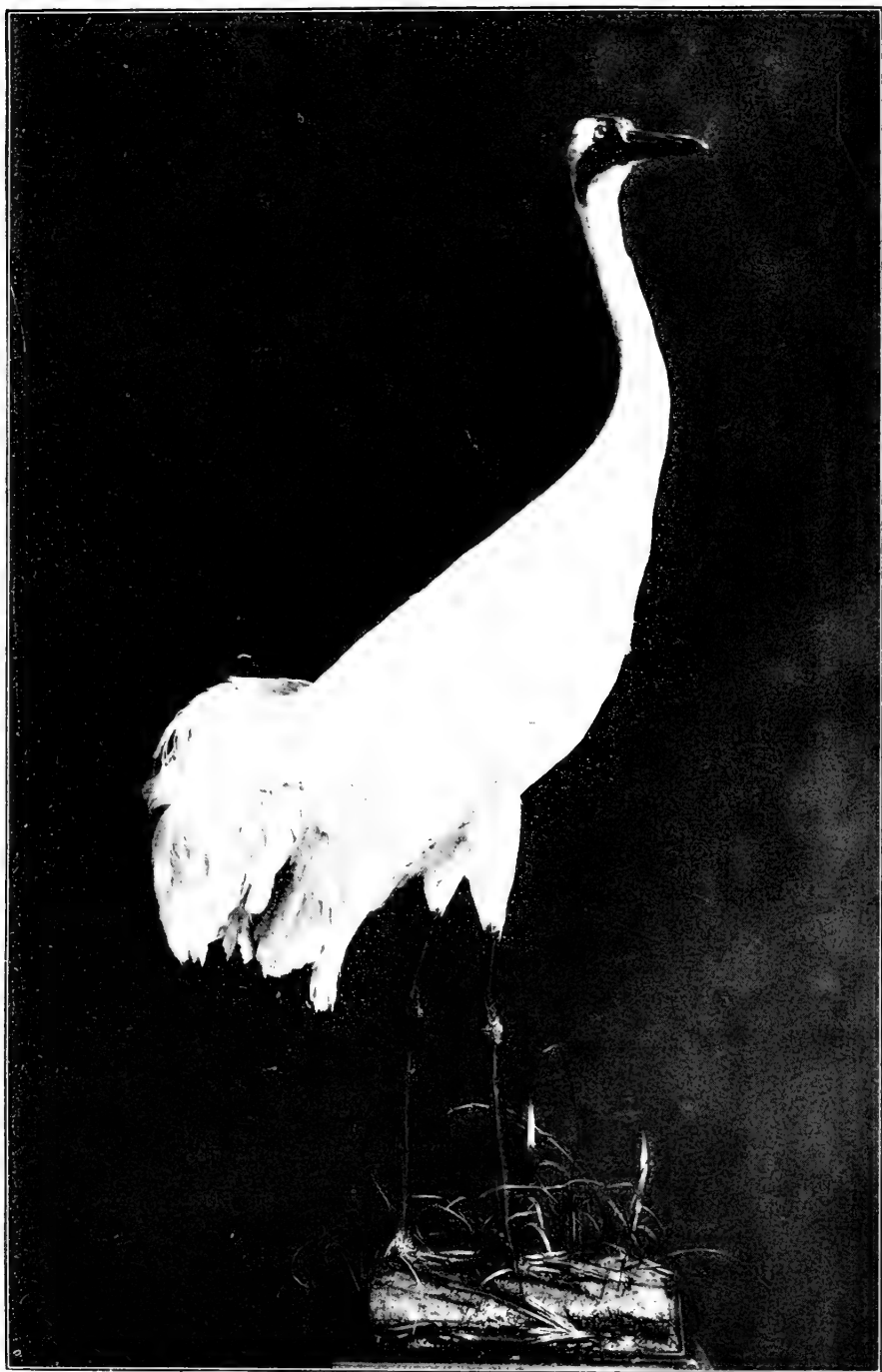
ALASKA WOLF.



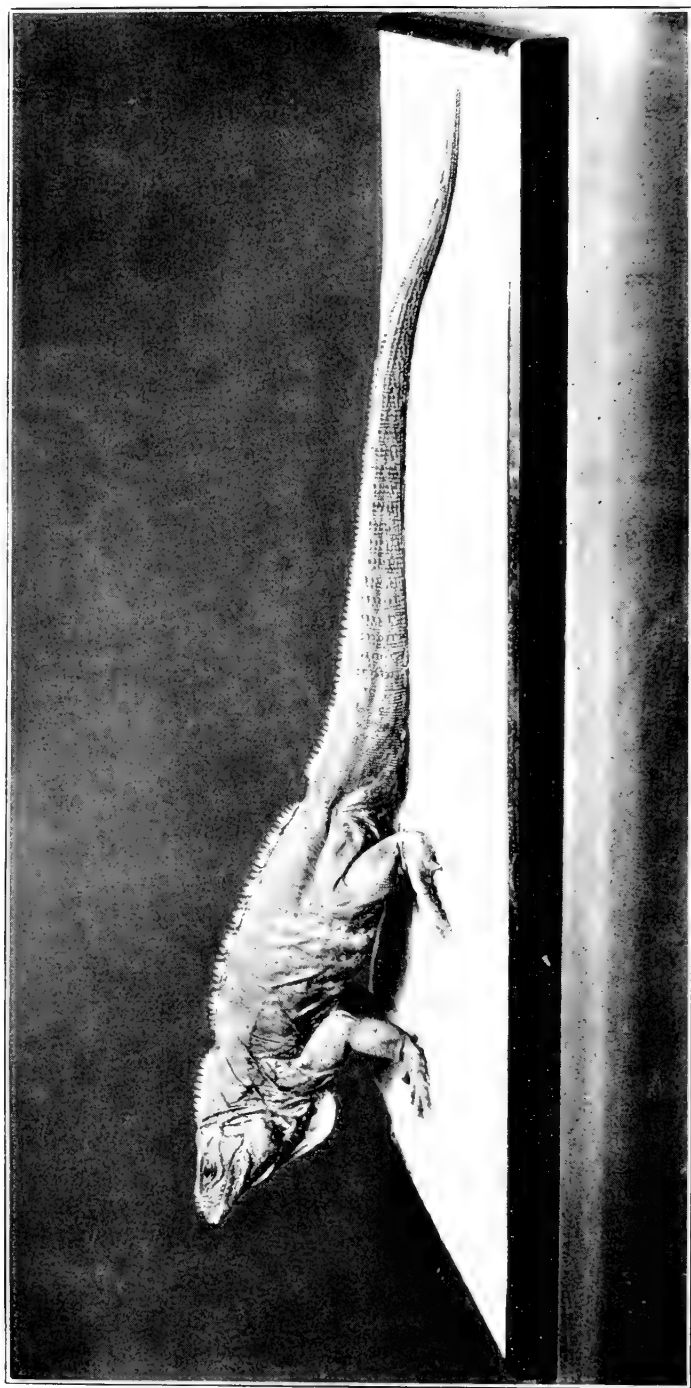
PENGUIN.



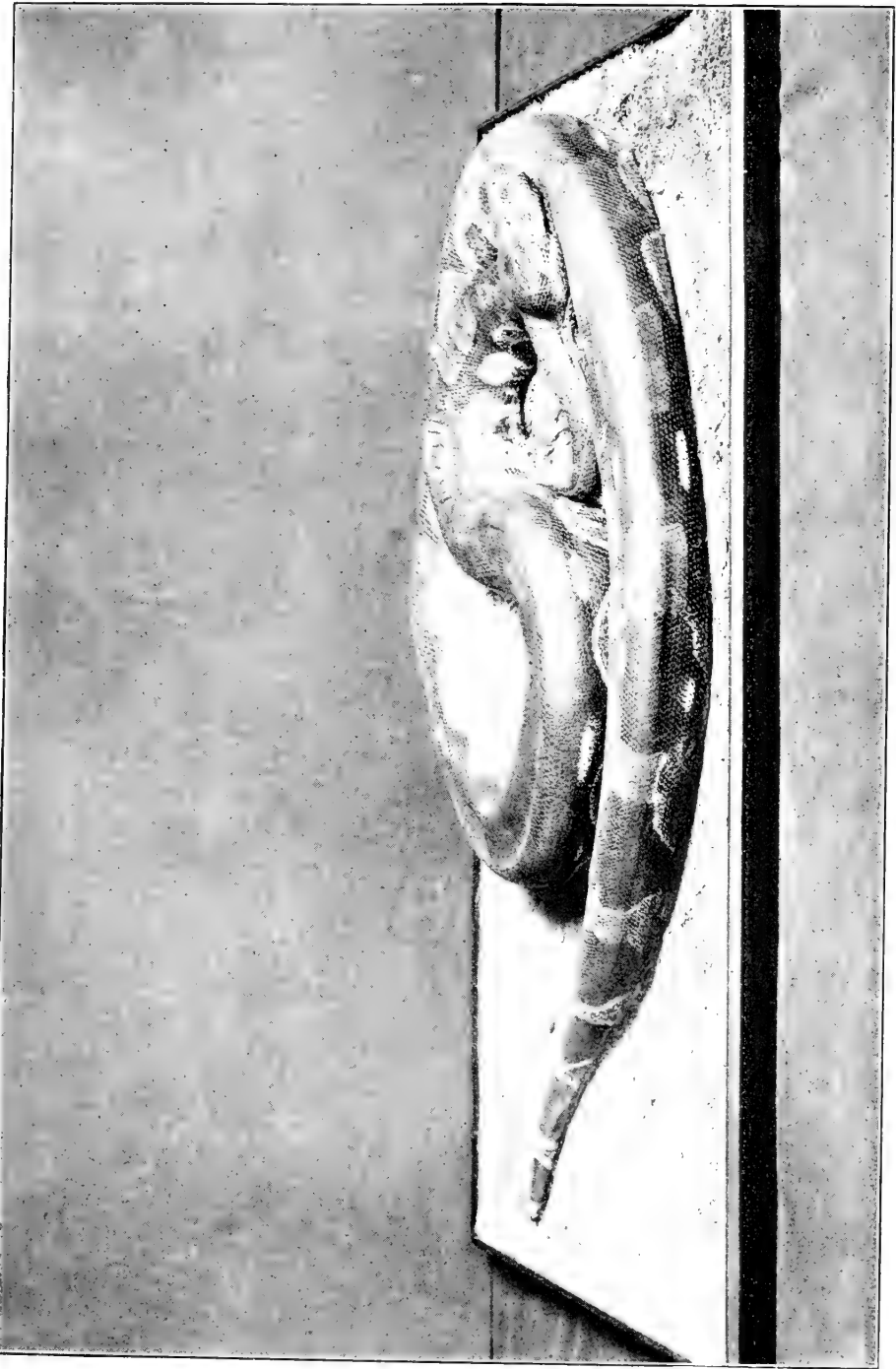
CONDOR.



WHOOPING CRANE.



CUBAN IGUANA.



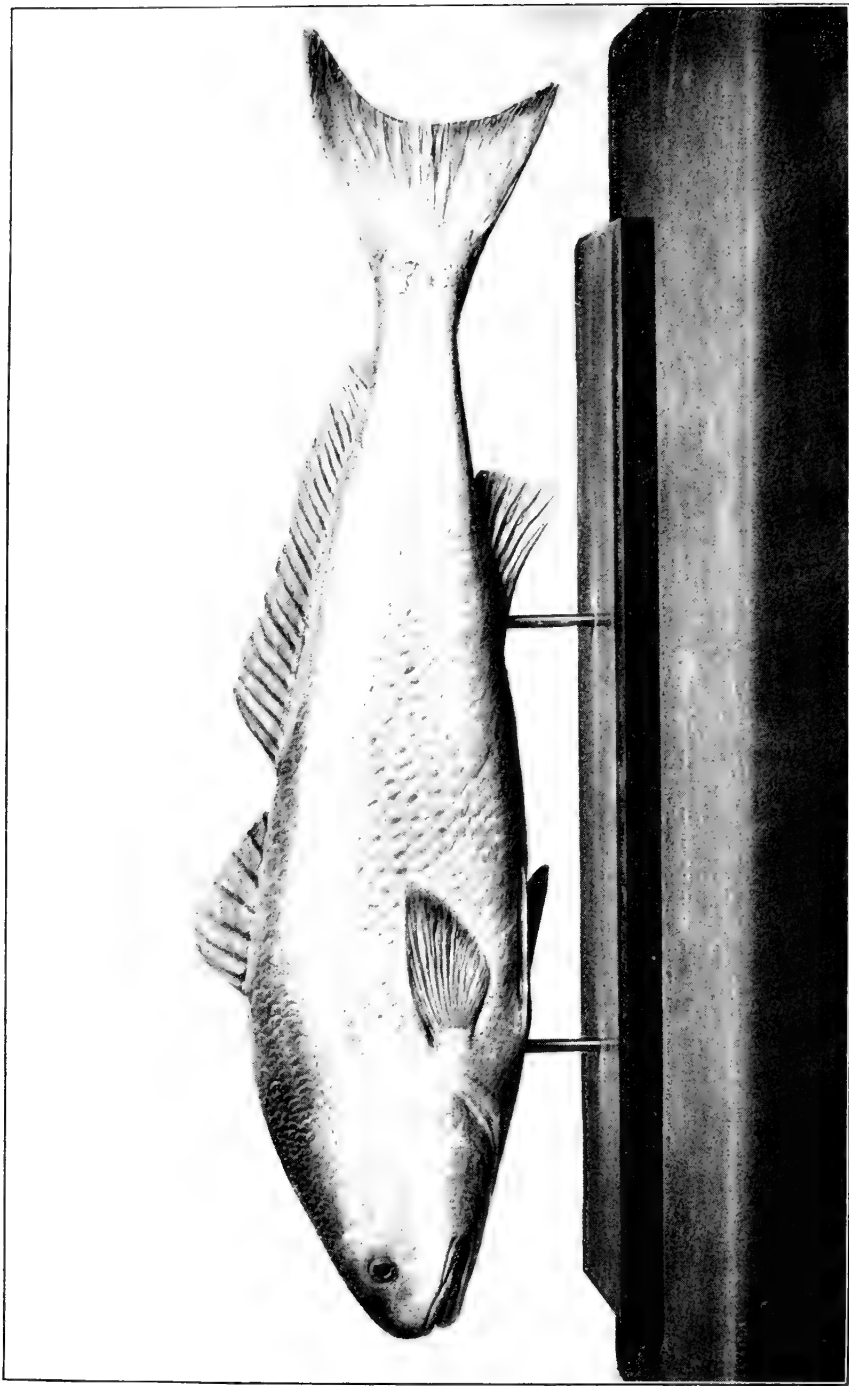
LARGE BOA CONSTICTOR.



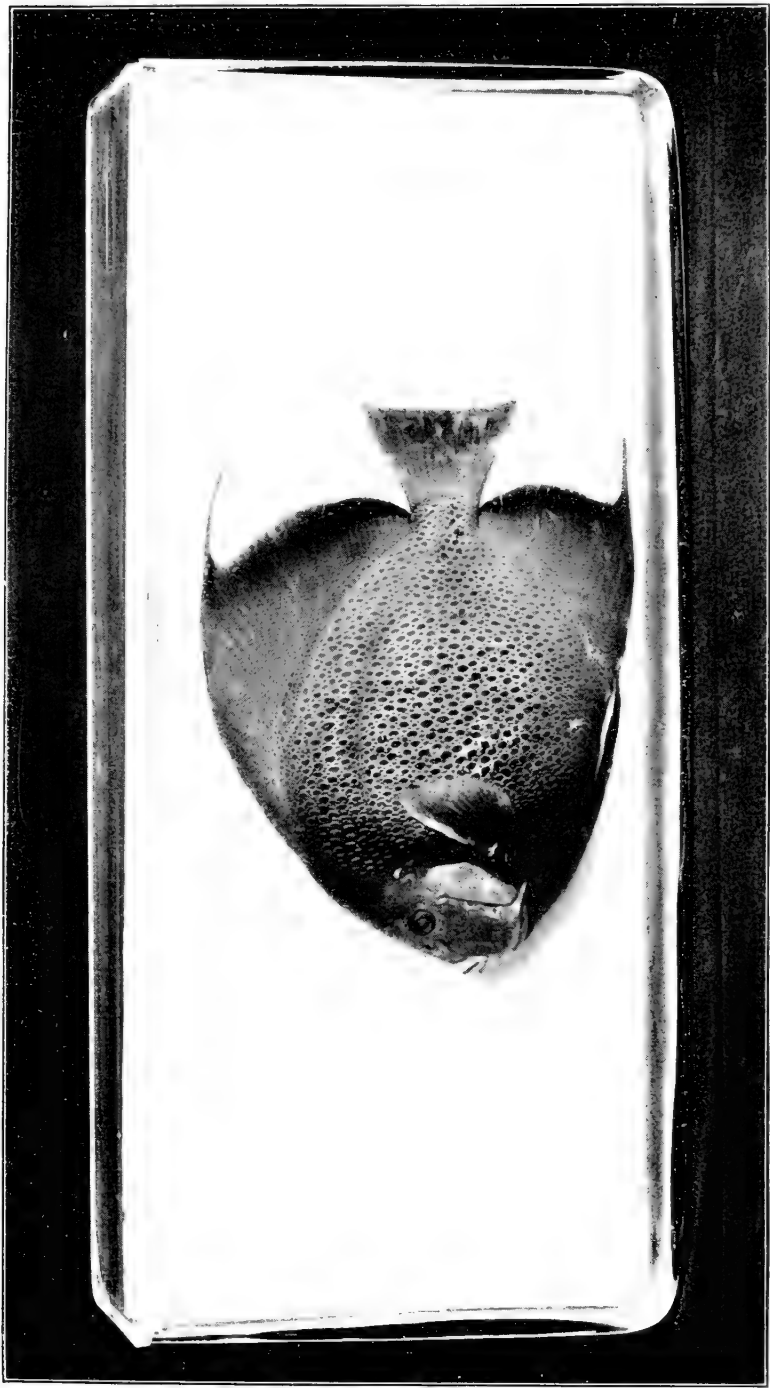
HOG-NOSE SNAKE GROUP.



ALLIGATOR SNAPPER.



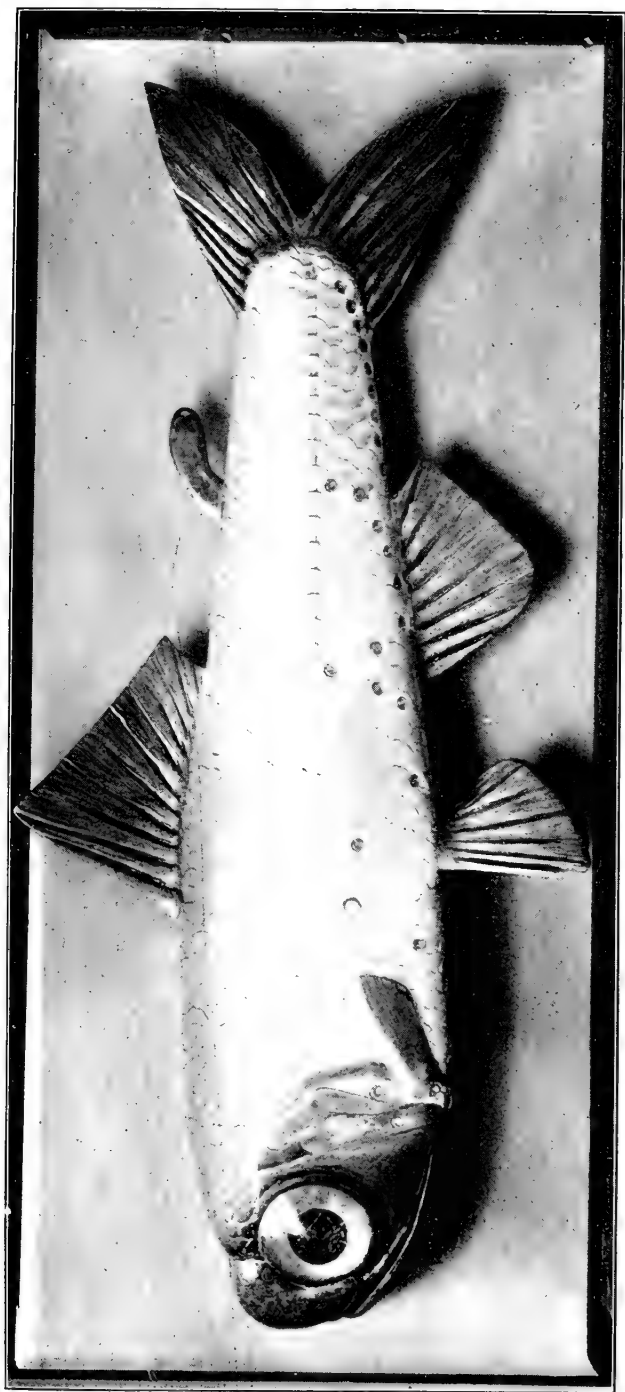
RED DRUM.



BLACK ANGEL-FISH IN FORMALIN.



HOG-FISH IN FORMALIN.



LUMINOUS DEEP-SEA FISH MODEL.



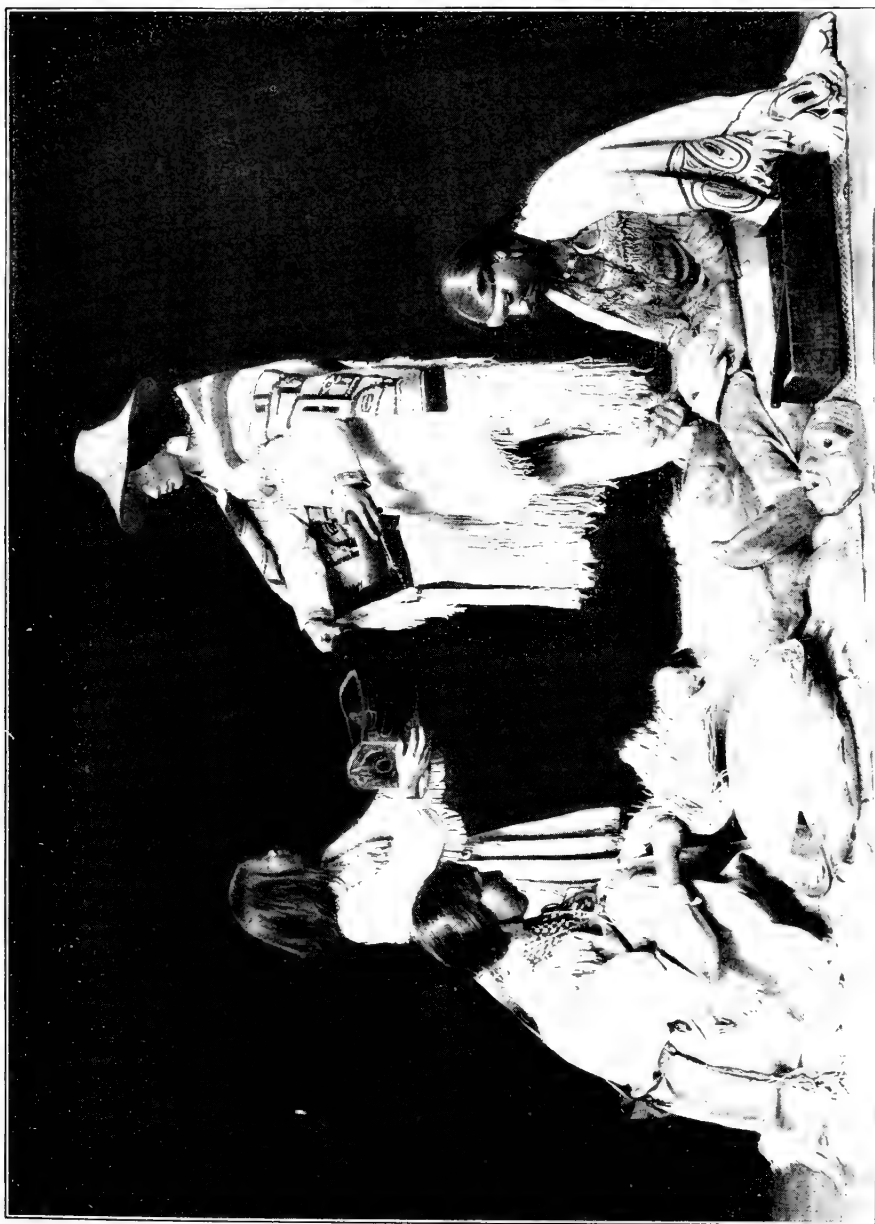
FAMILY GROUP OF THE SMITH SOUND ESKIMO.



LAY FIGURE GROUP OF EASTERN ESKIMO.



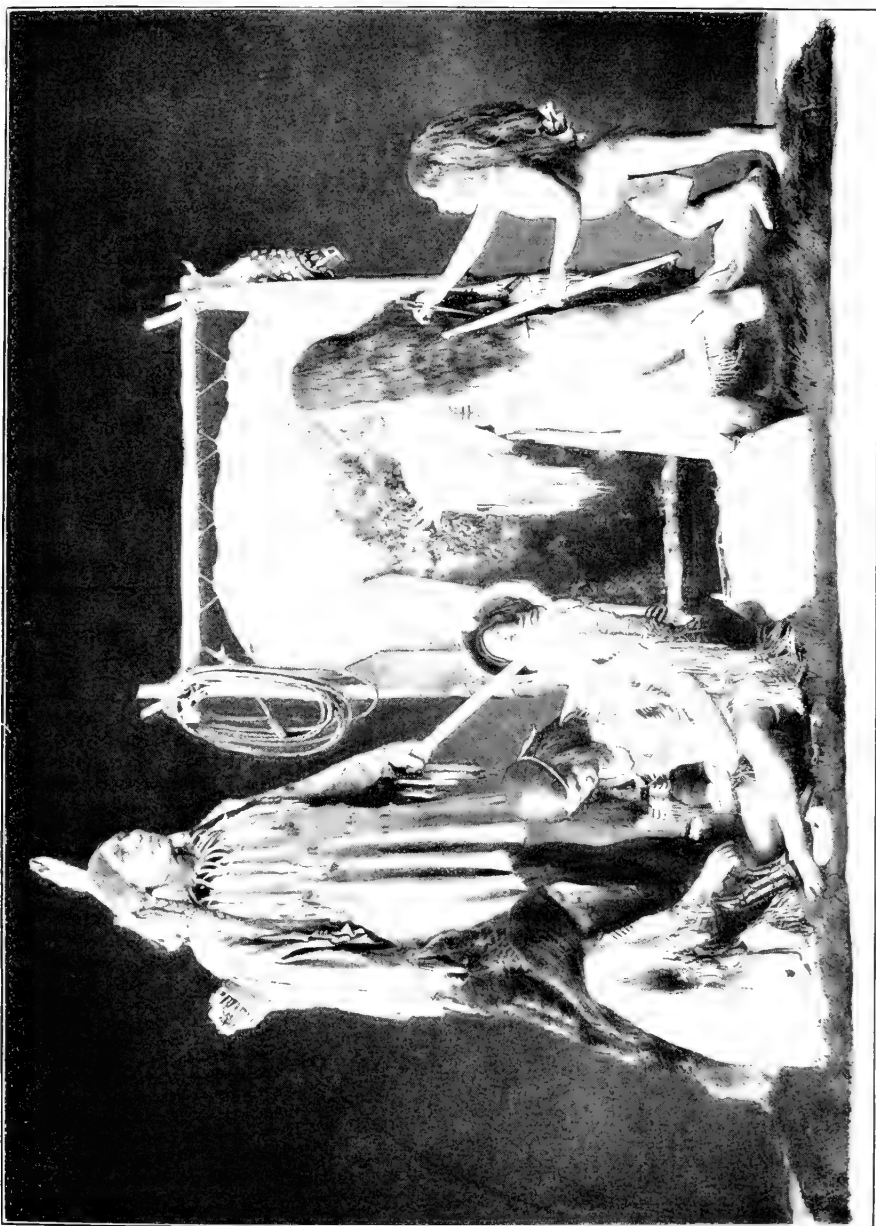
LAY FIGURE GROUP OF WESTERN ESKIMO.



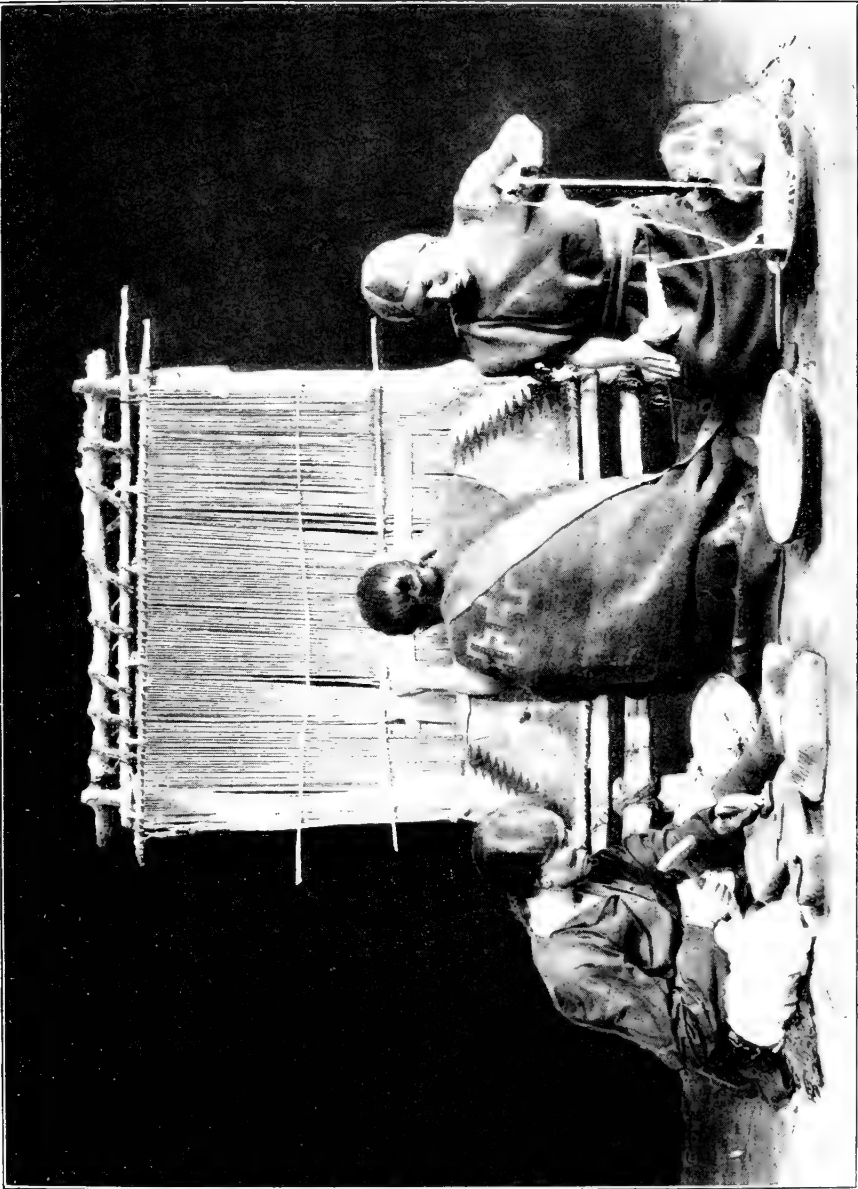
FAMILY GROUP OF CHILKAT INDIANS.



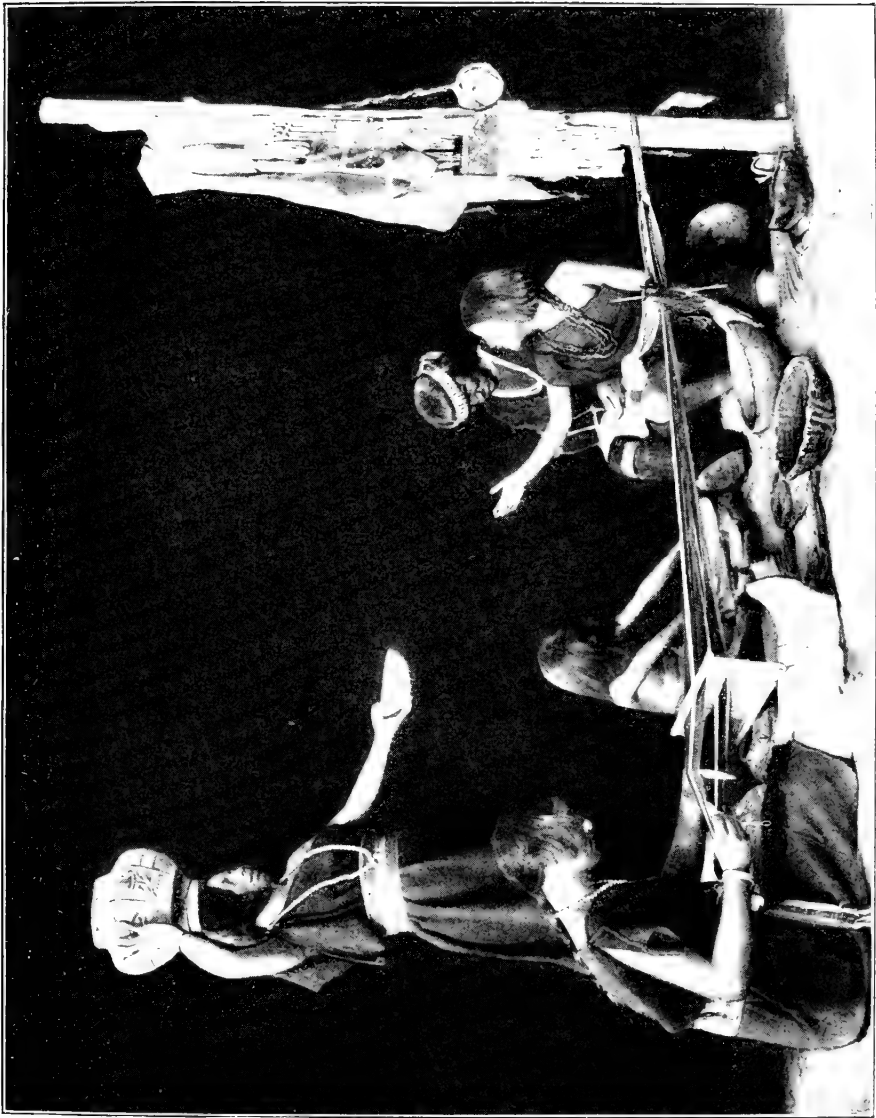
FAMILY GROUP OF HUPA INDIANS.



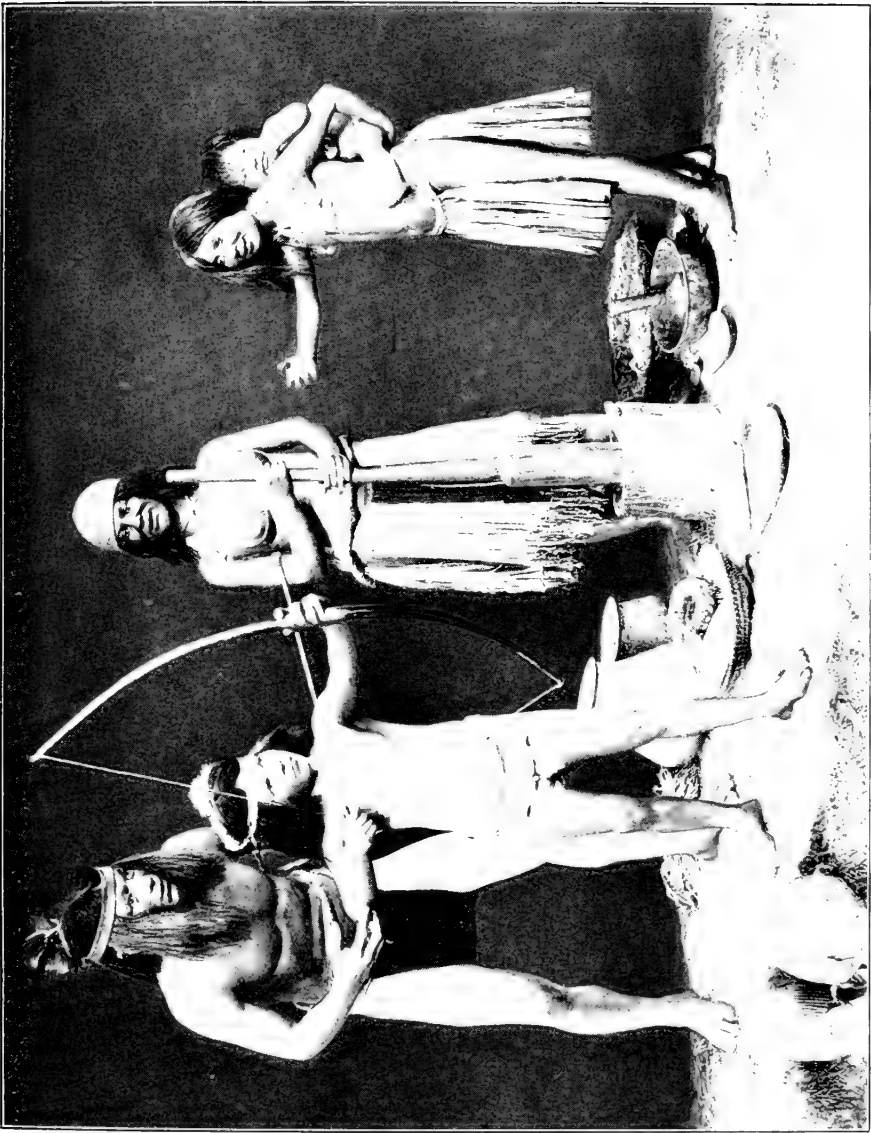
FAMILY GROUP OF SIOUX INDIANS.



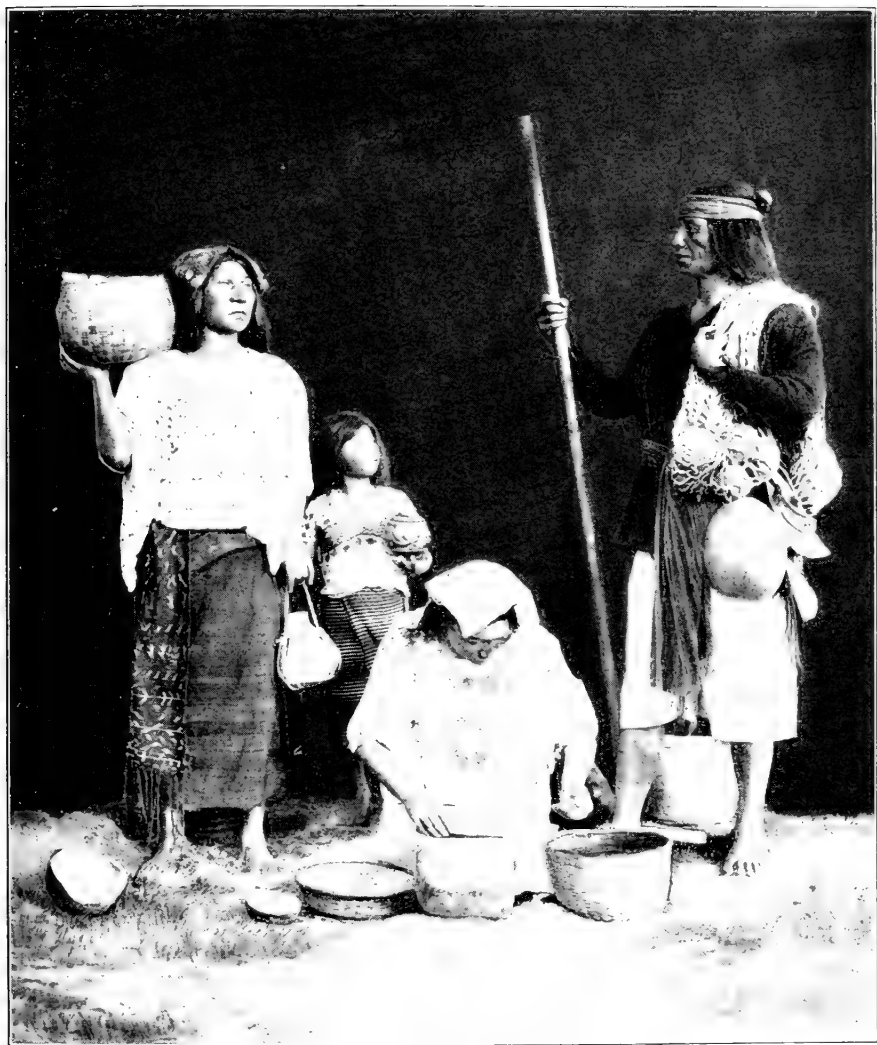
FAMILY GROUP OF NAVAHO INDIANS.



FAMILY GROUP OF ZUNI INDIANS.



FAMILY GROUP OF COCOPA INDIANS.



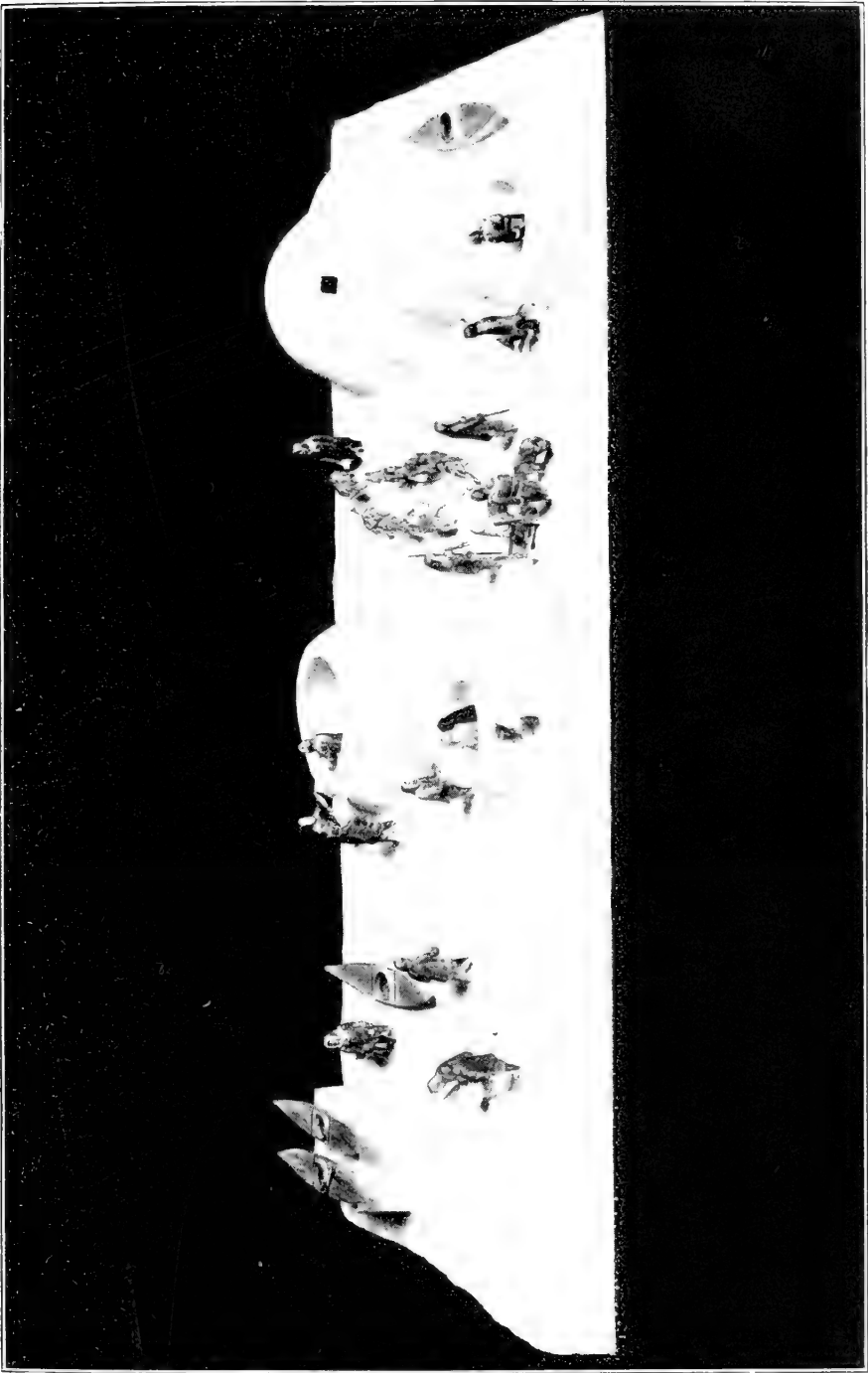
FAMILY GROUP OF MAYA-QUICHE INDIANS.



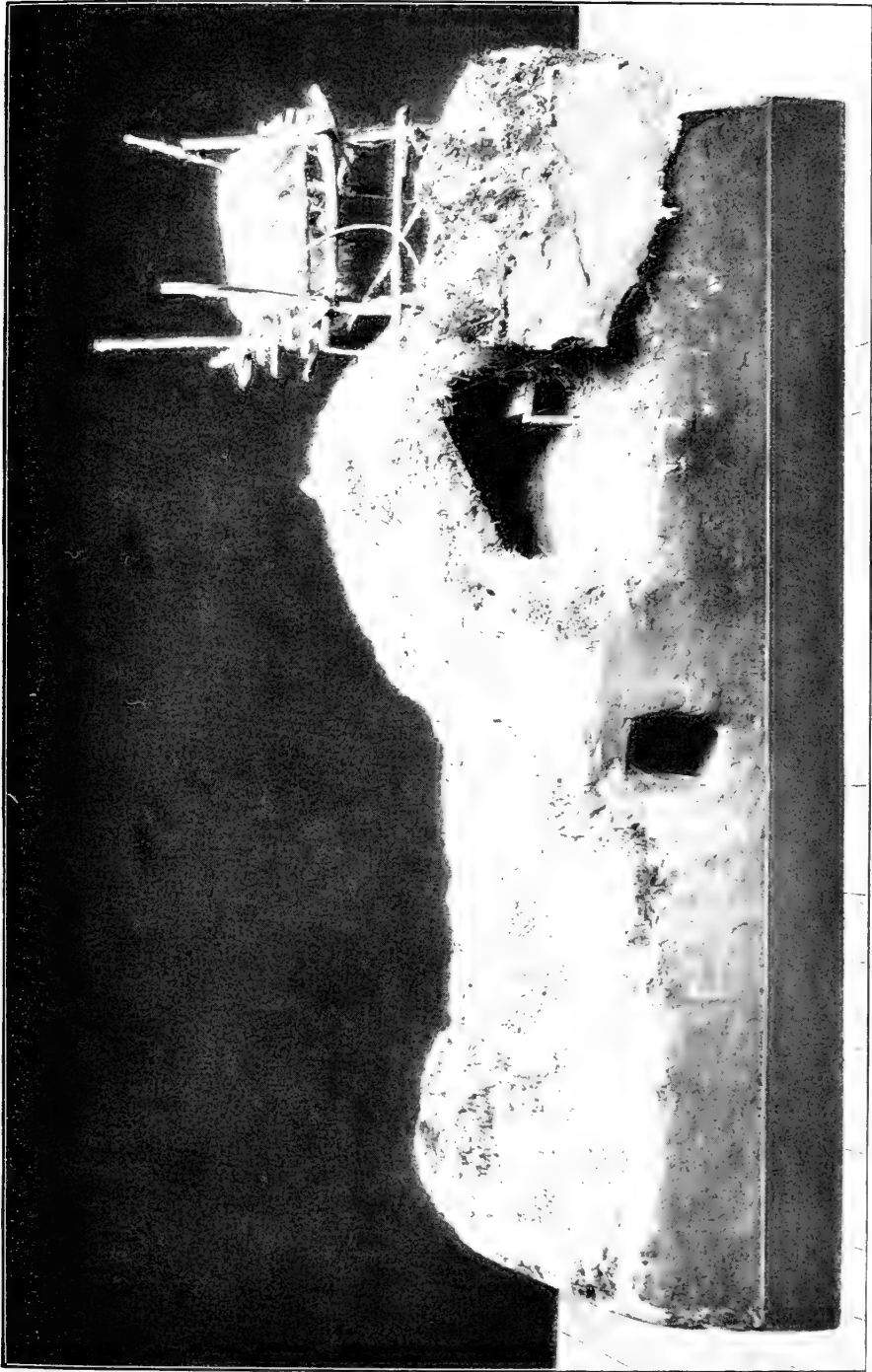
LAY FIGURE GROUP OF MEXICAN AND SOUTH AMERICAN INDIANS.



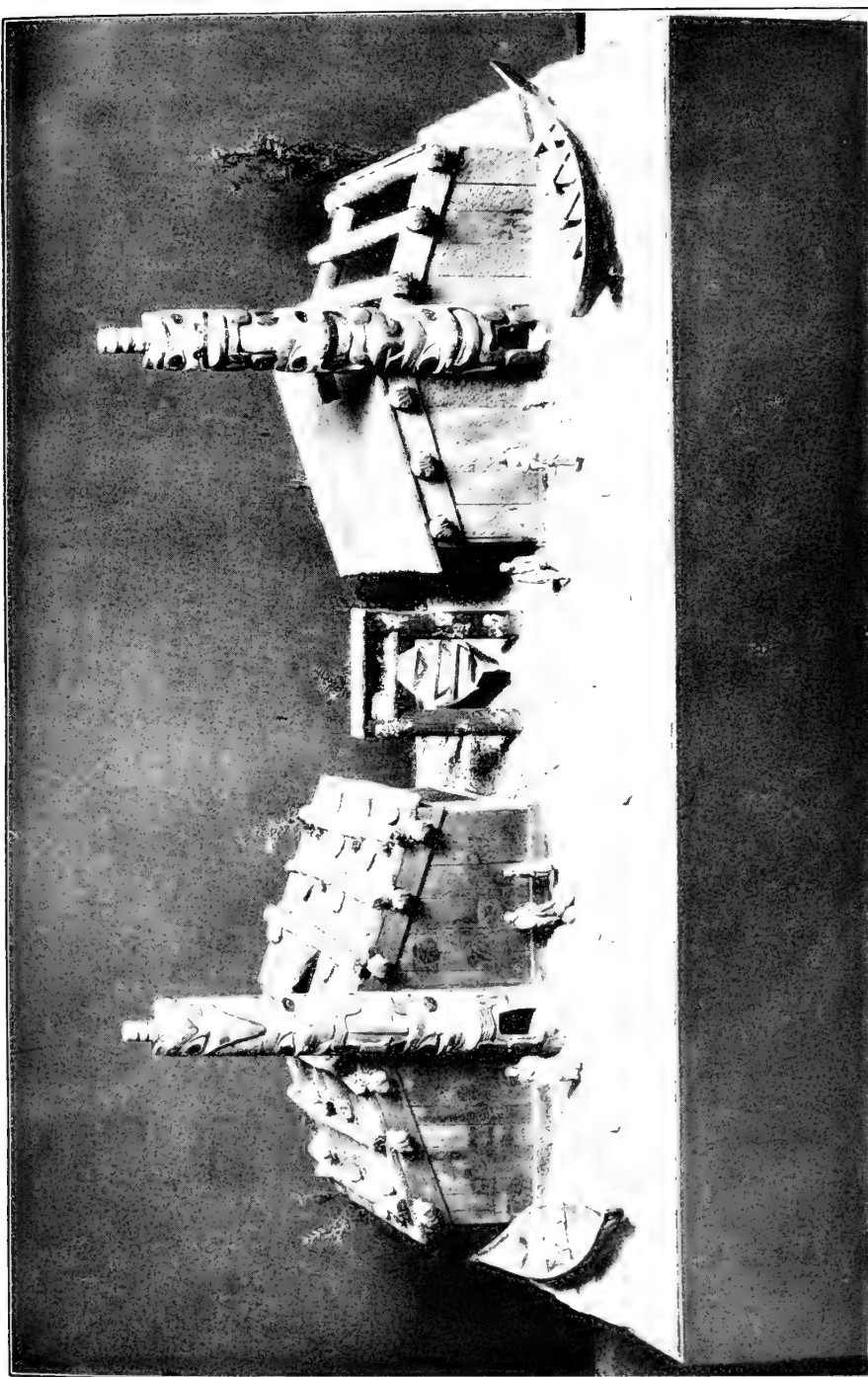
FAMILY GROUP OF TEHUELCHÉ INDIANS.



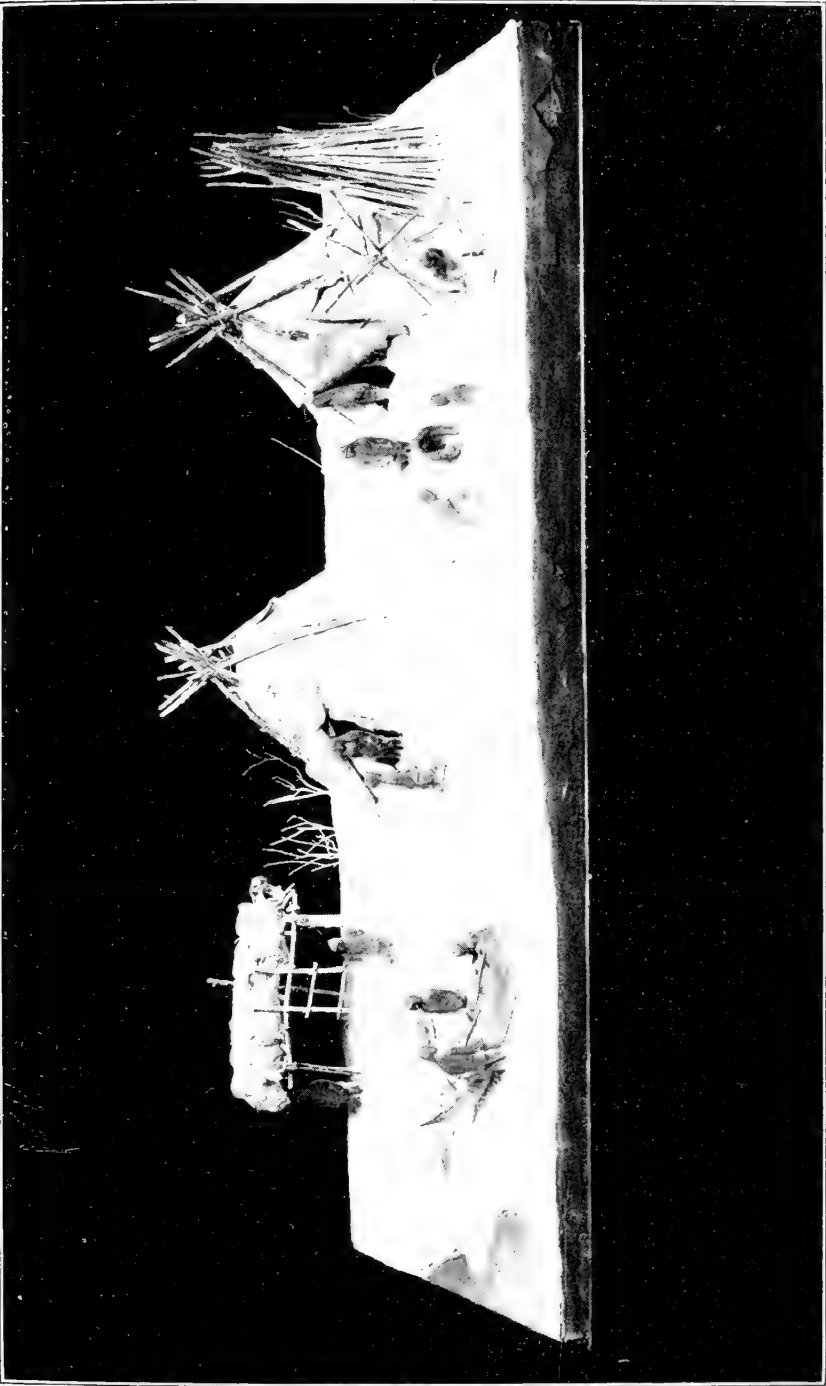
DWELLING GROUP OF CENTRAL ESKIMO.



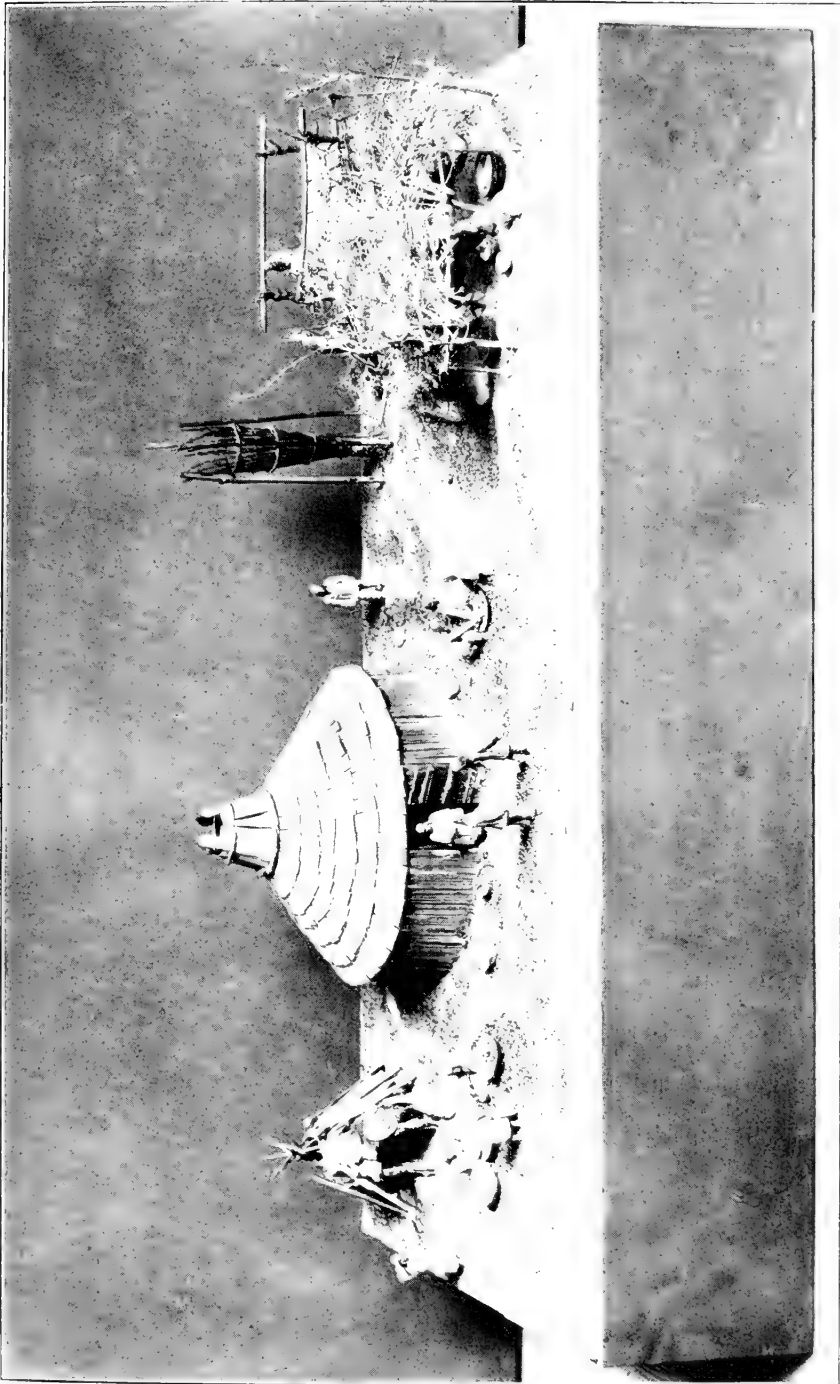
DWELLING GROUP OF THE WESTERN ESKIMO.



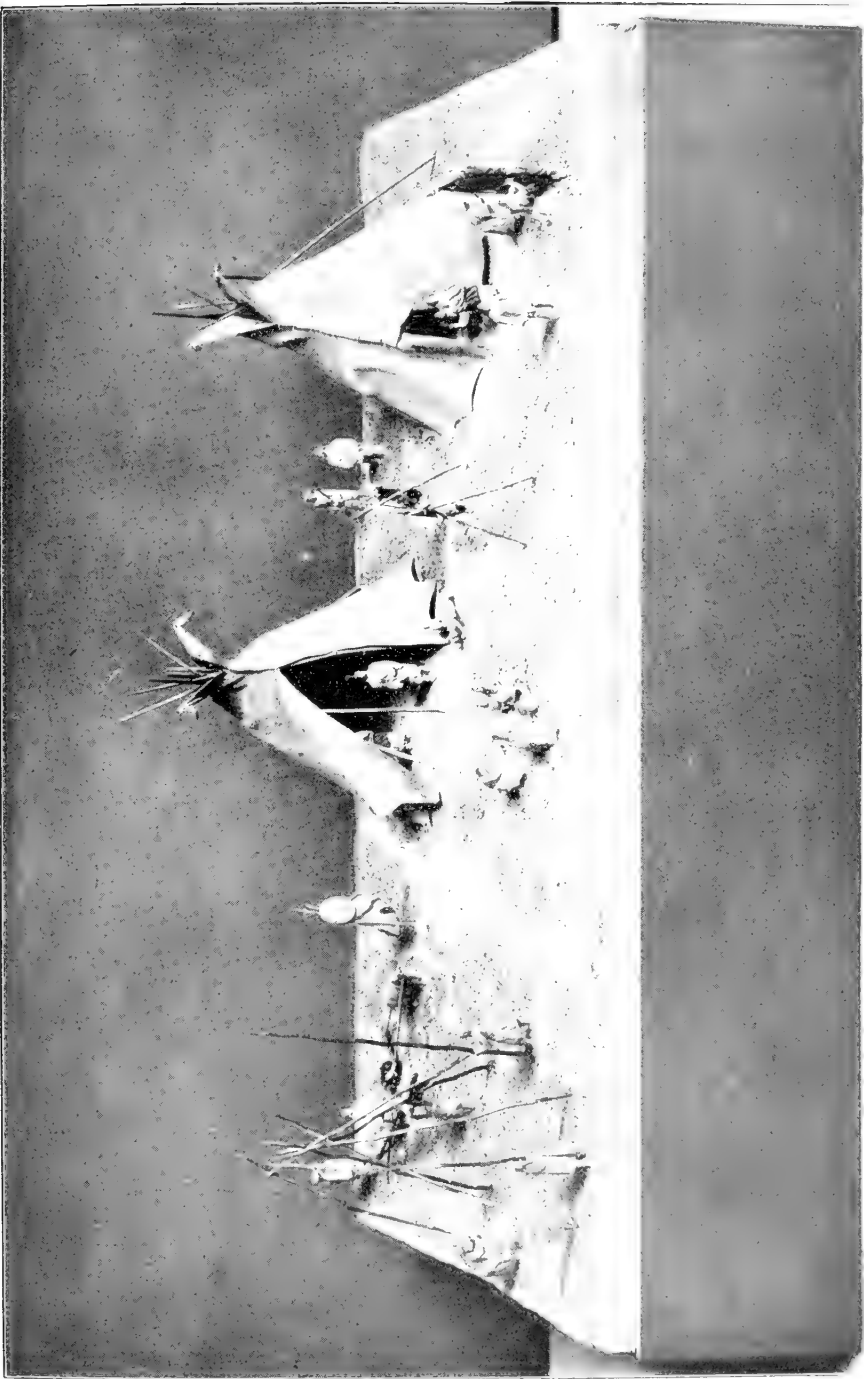
DWELLING GROUP OF THE HAIDA INDIANS.



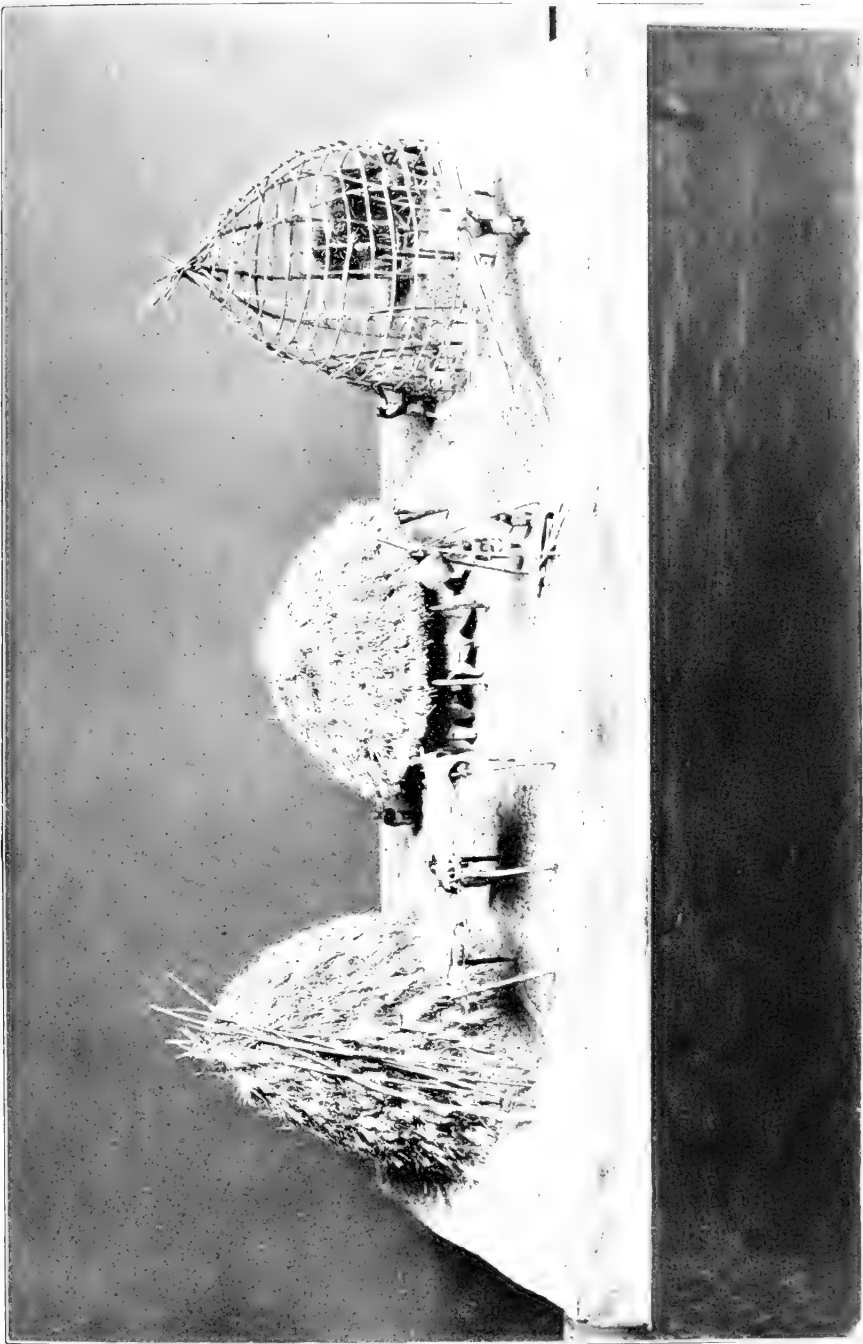
DWELLING GROUP OF THE MONTAGNAIS INDIANS.



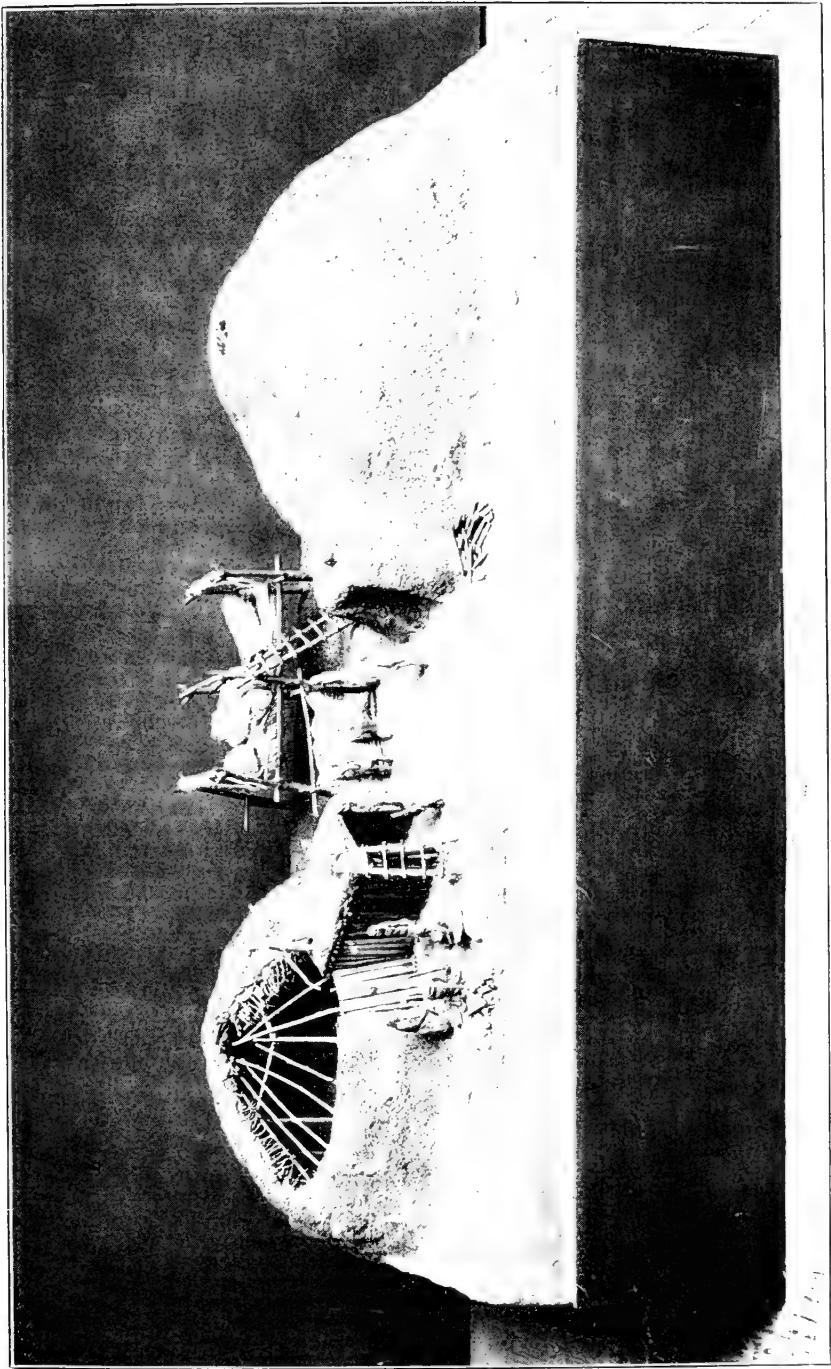
DWELLING GROUP OF CALIFORNIA INDIANS.



DWELLING GROUP OF THE SIOUX INDIANS.



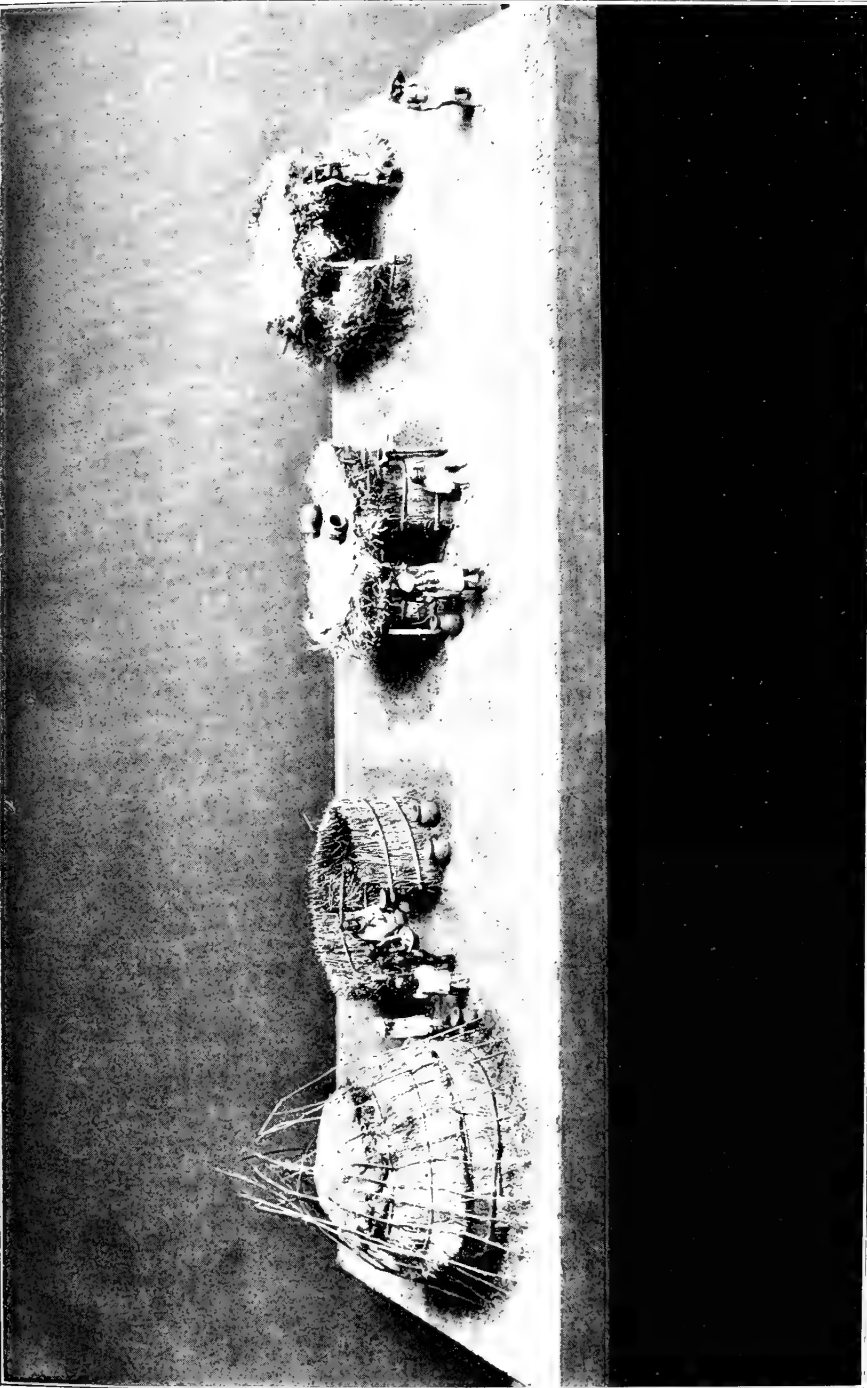
DWELLING GROUP OF THE WICHITA INDIANS.



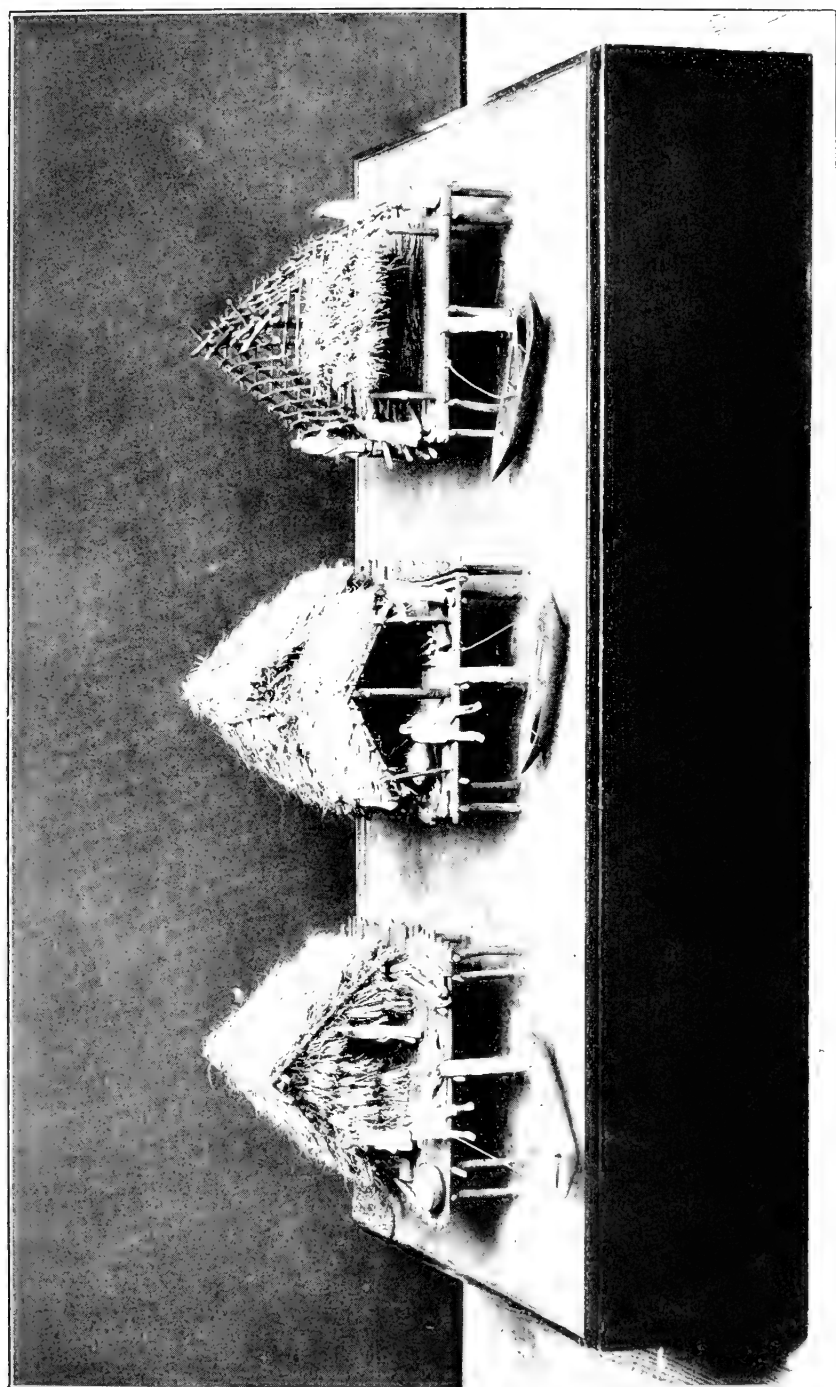
DWELLING GROUP OF THE PAWNEE INDIANS.



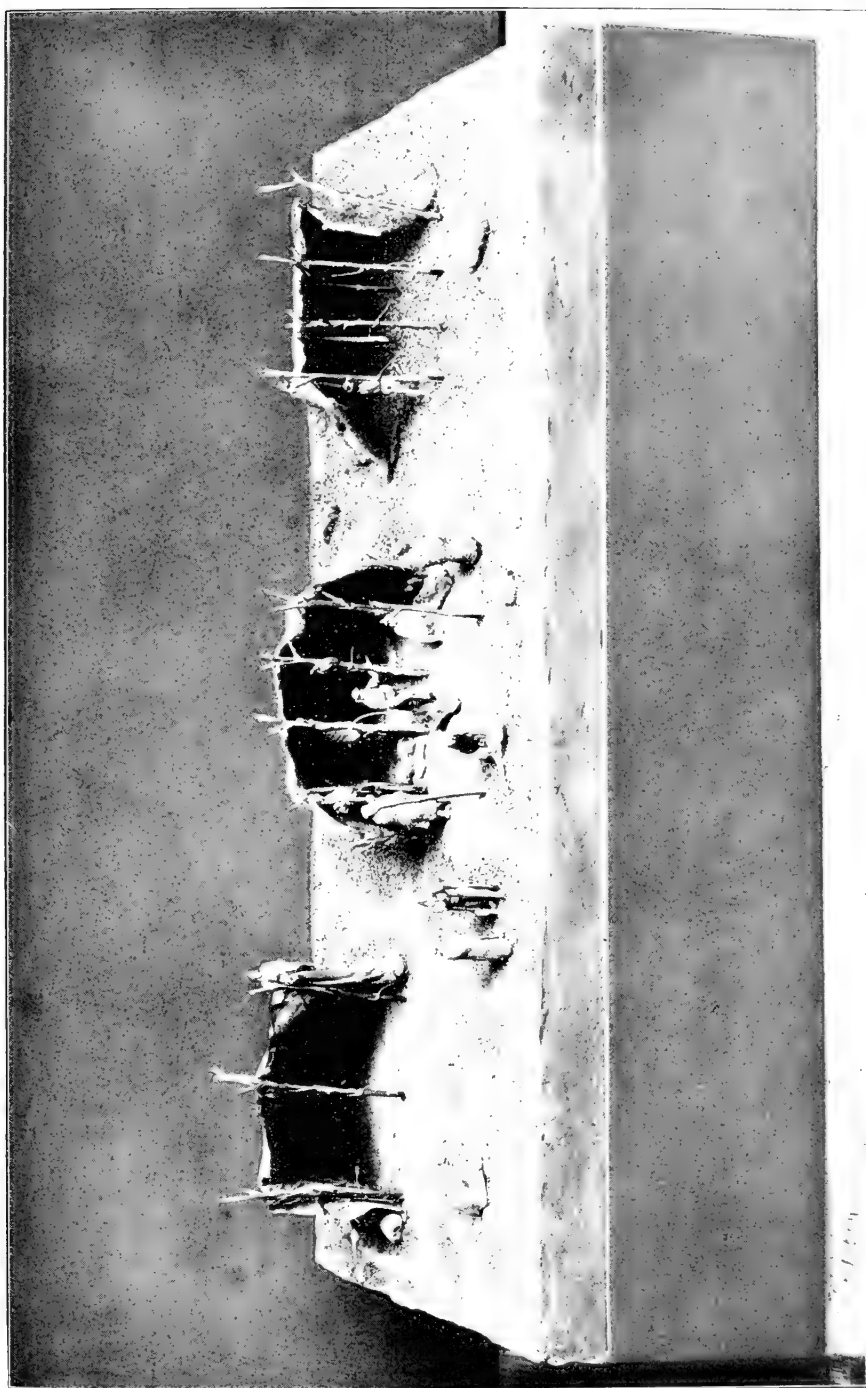
DWELLING GROUP OF THE CLIFF DWELLERS.



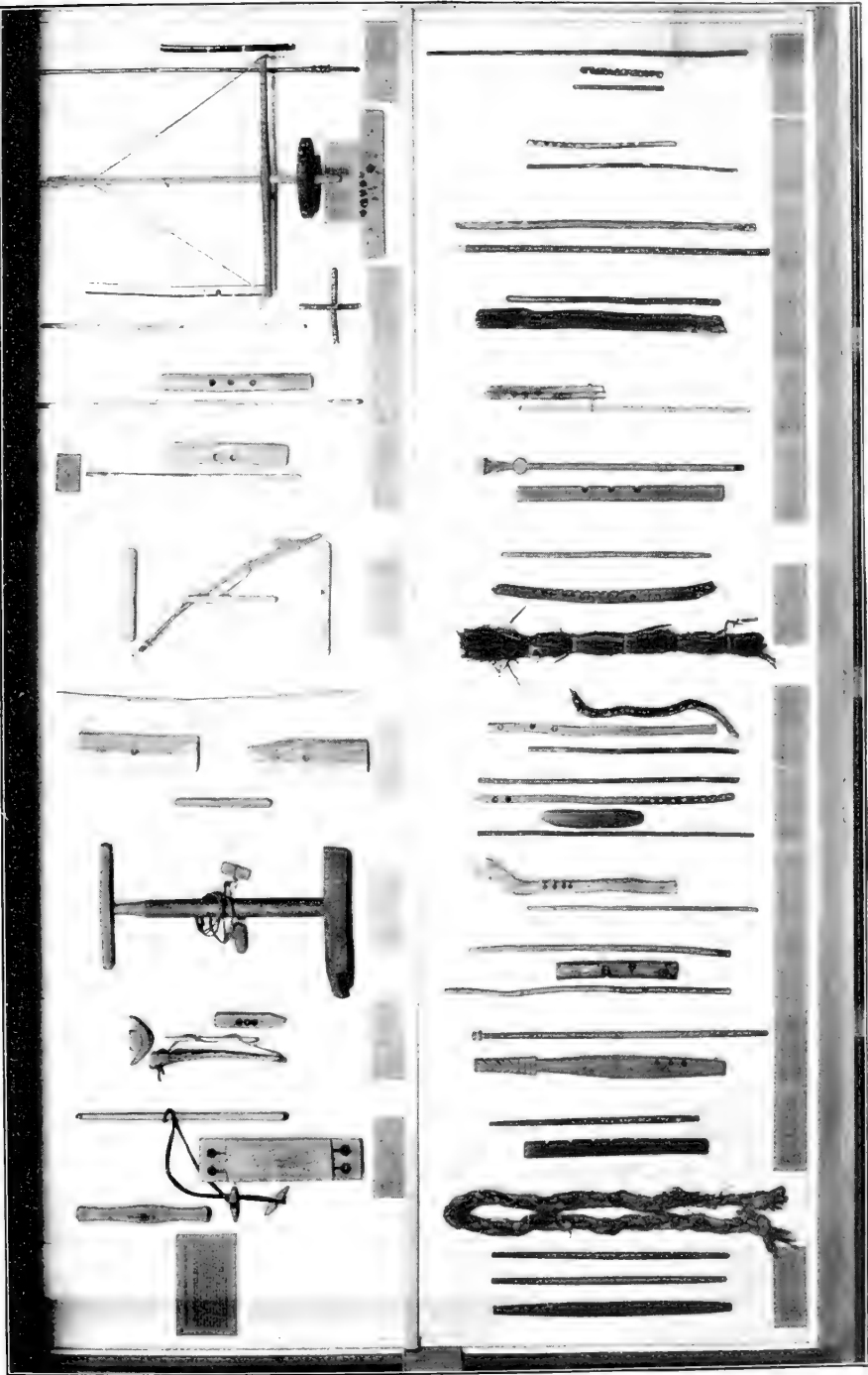
DWELLING GROUP OF THE PAPAGO INDIANS.



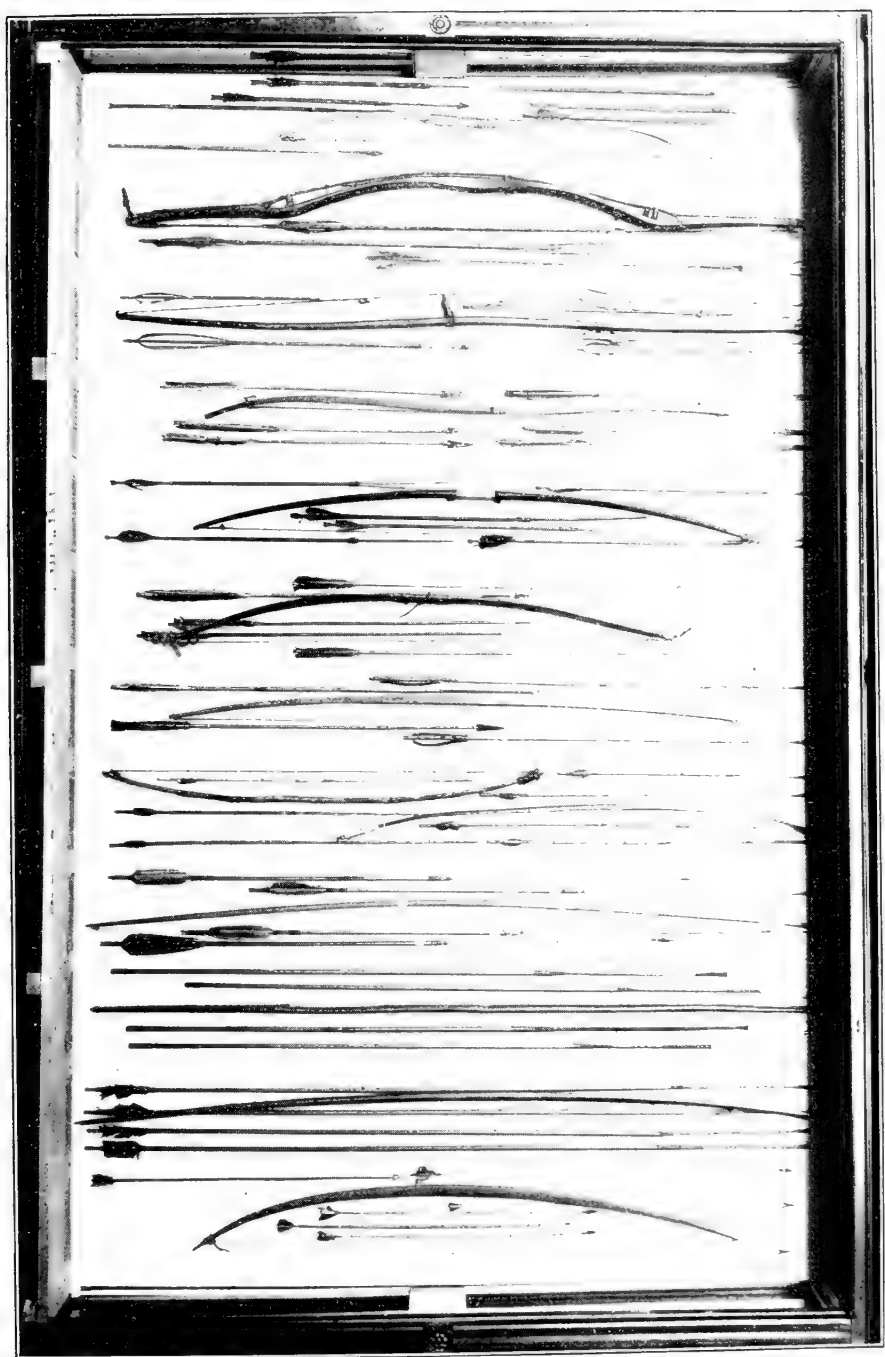
DWELLING GROUP OF VENEZUELA INDIANS.



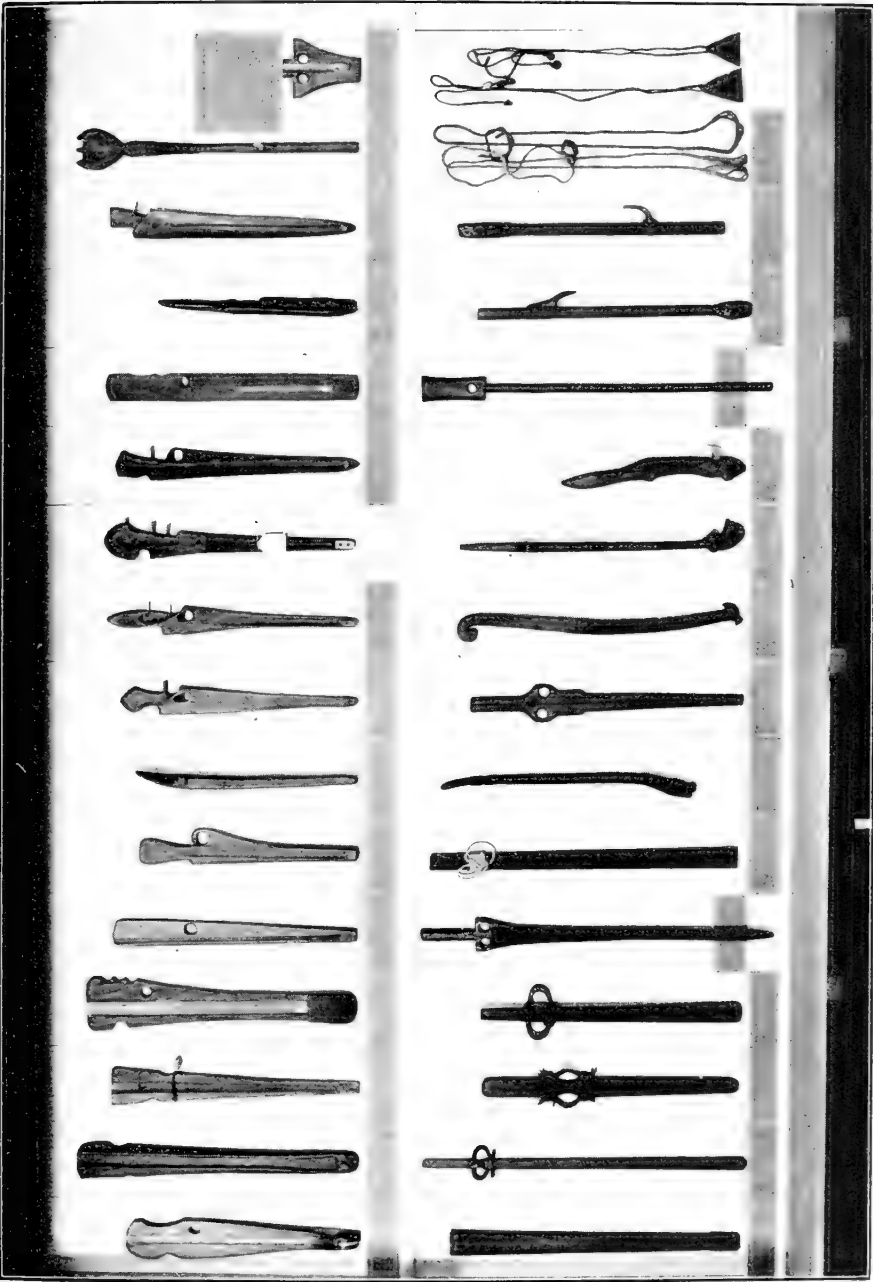
DWELLING GROUP OF THE TEHUELCHÉ INDIANS.



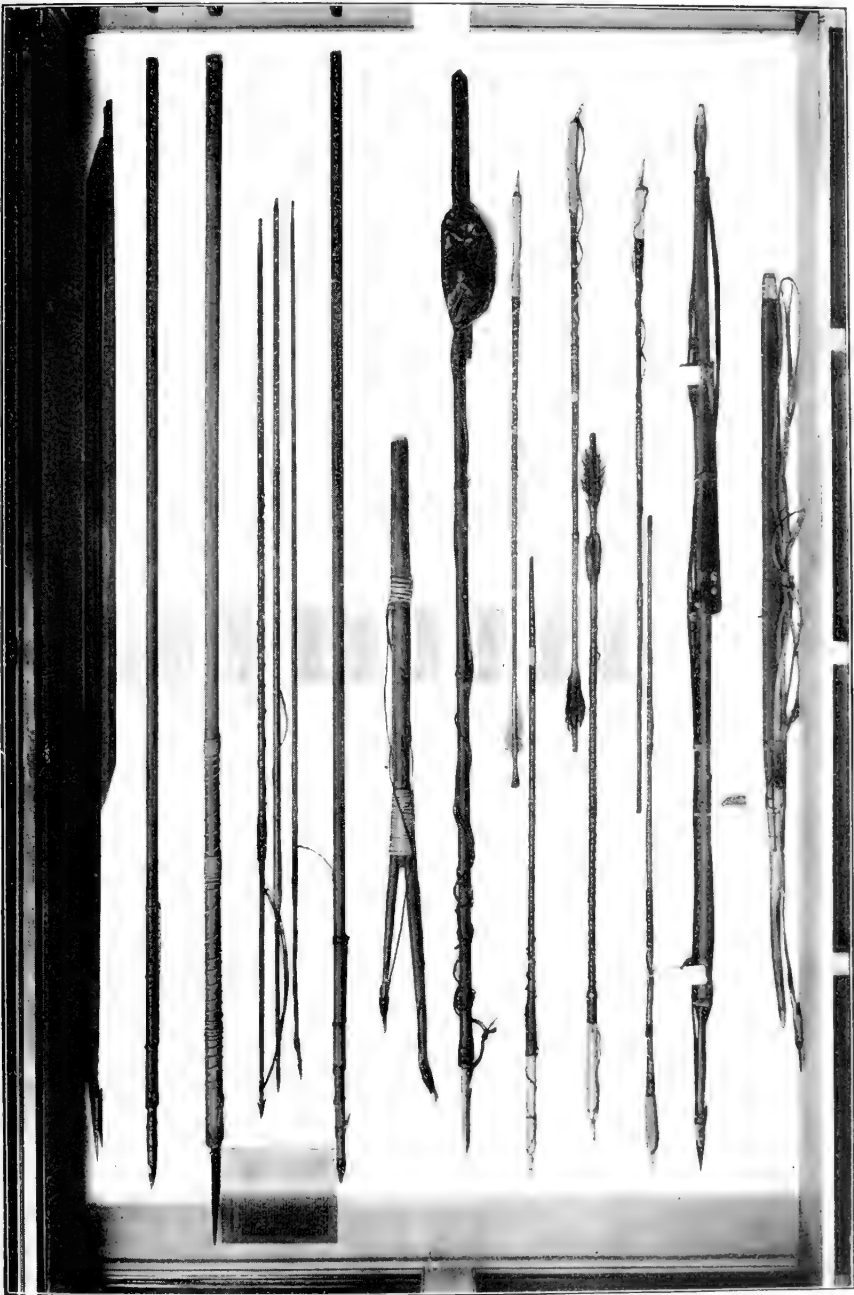
FIRE-MAKING APPARATUS OF THE AMERICAN INDIANS.



BOWS AND ARROWS OF THE AMERICAN INDIANS.



THROWING STICKS OF THE AMERICAN INDIANS.



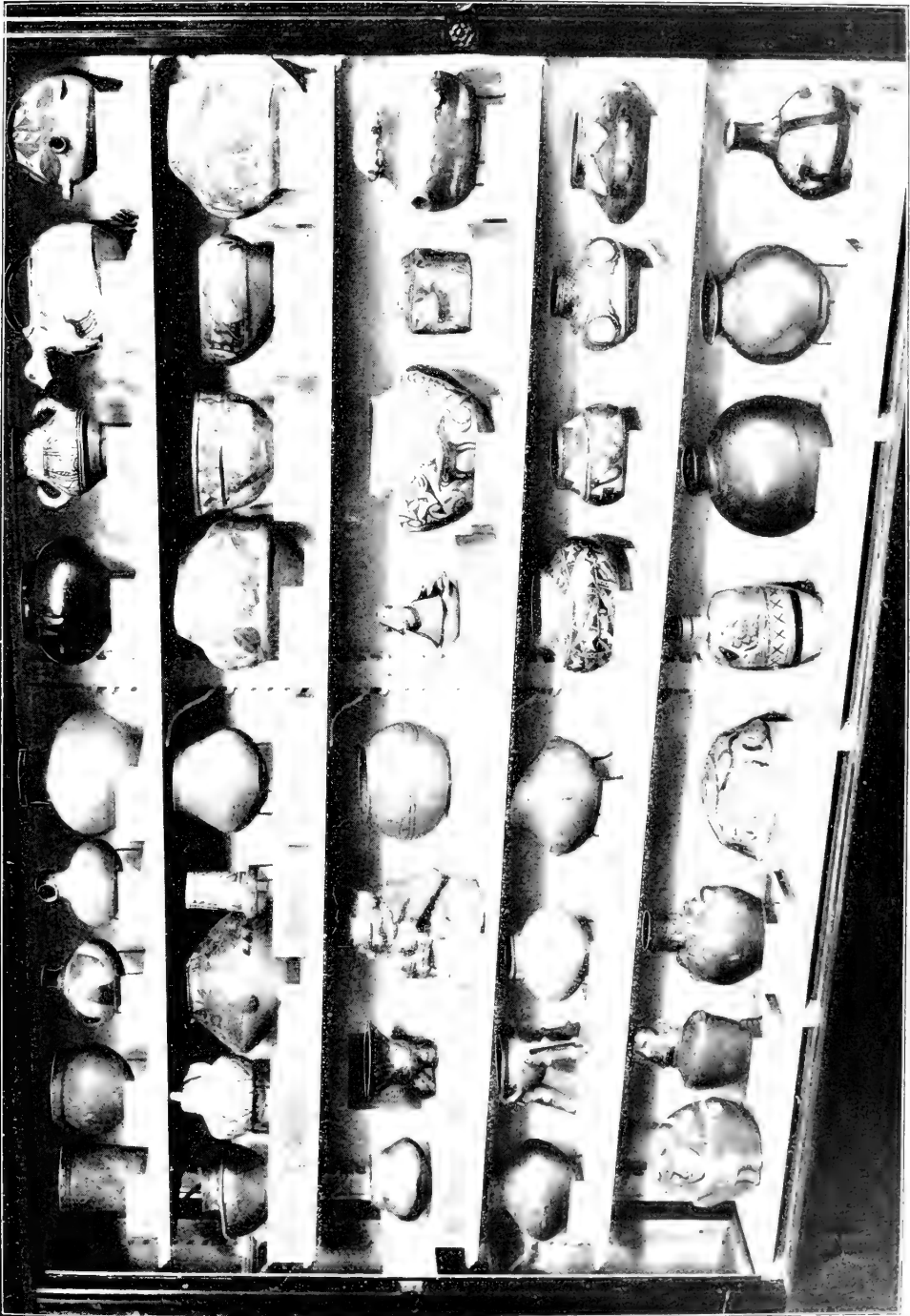
HARPOONS OF THE AMERICAN INDIANS.



WATER CRAFT OF THE AMERICAN INDIANS.



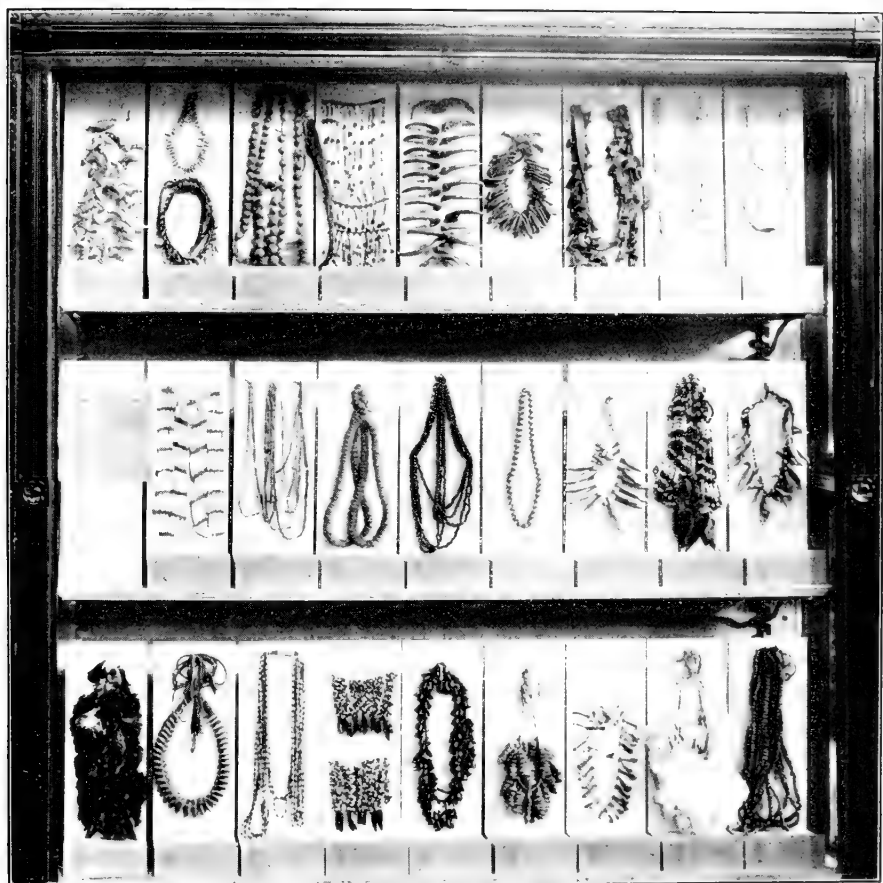
TEXTILES OF THE AMERICAN INDIANS.



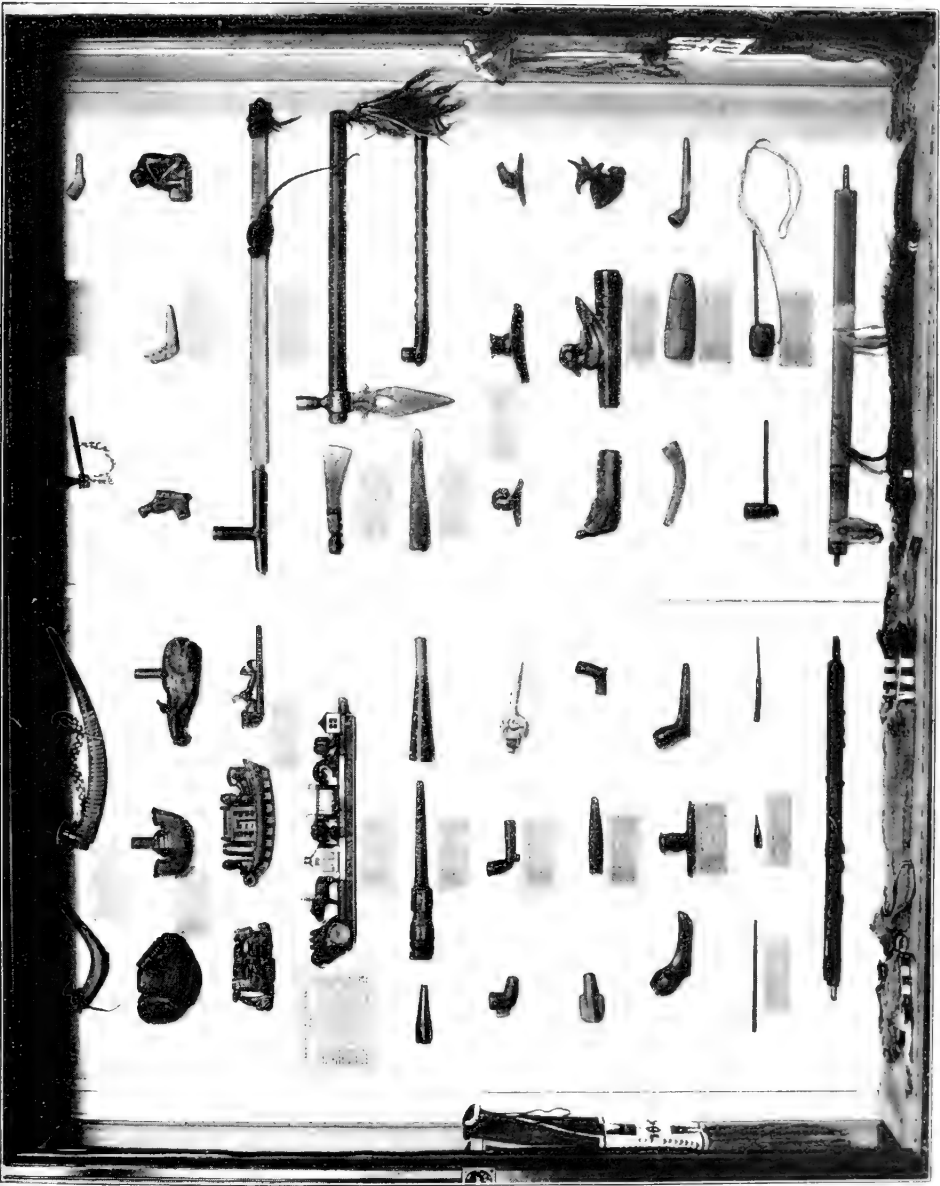
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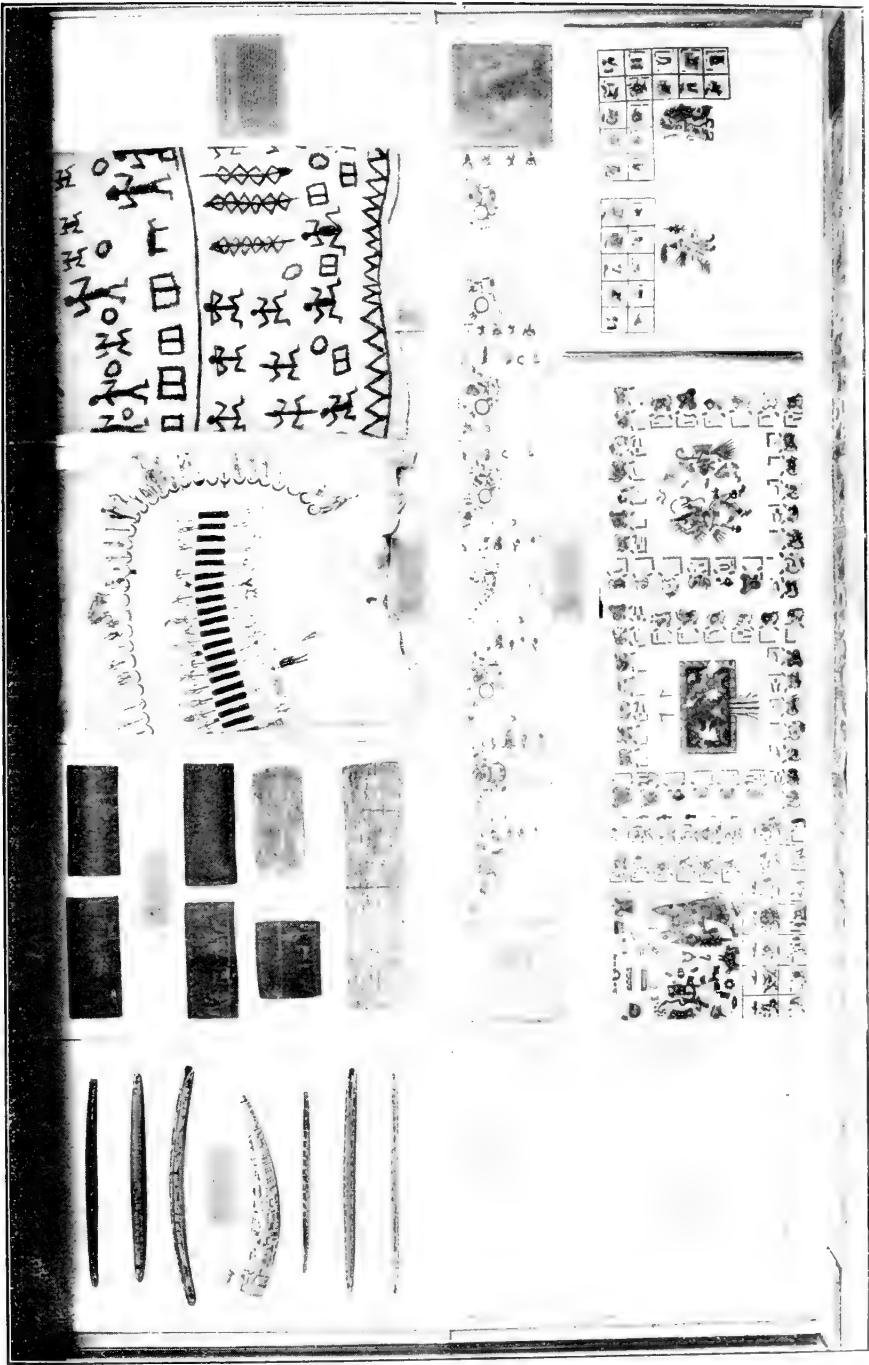
SCULPTURE OF THE AMERICAN INDIANS.



PERSONAL ADORNMENTS OF THE AMERICAN INDIANS.



TOBACCO PIPES OF THE AMERICAN INDIANS.



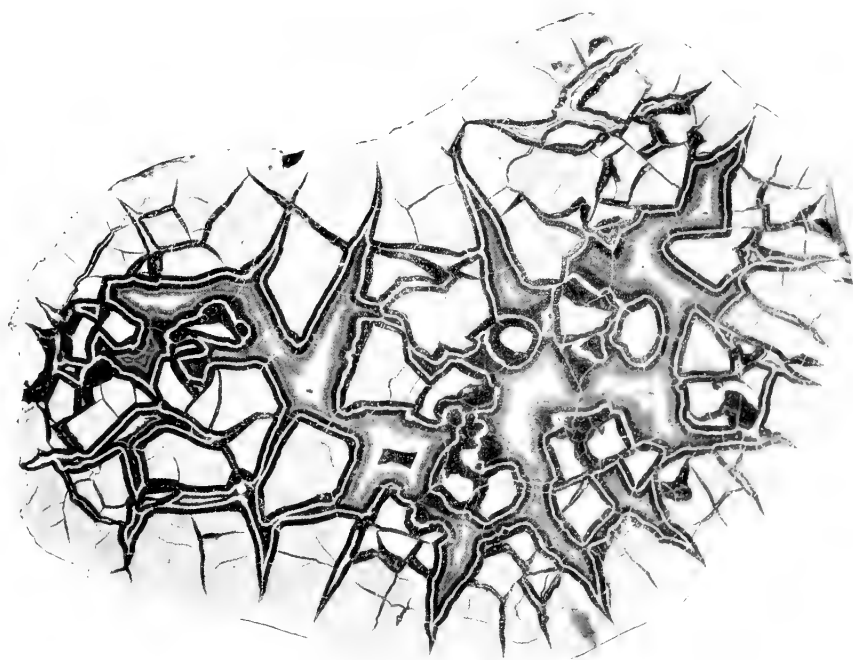
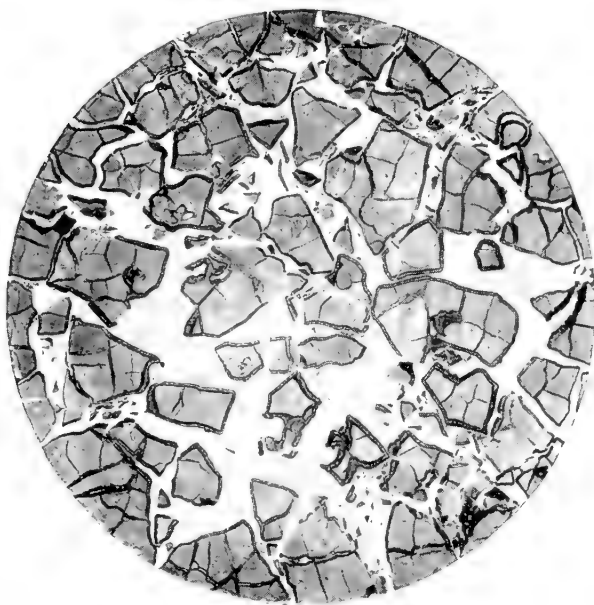
PICTOGRAPHY AND WRITING OF THE AMERICAN INDIANS.



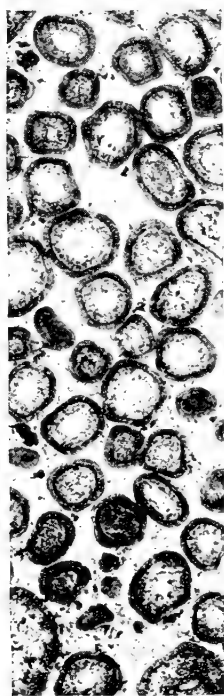
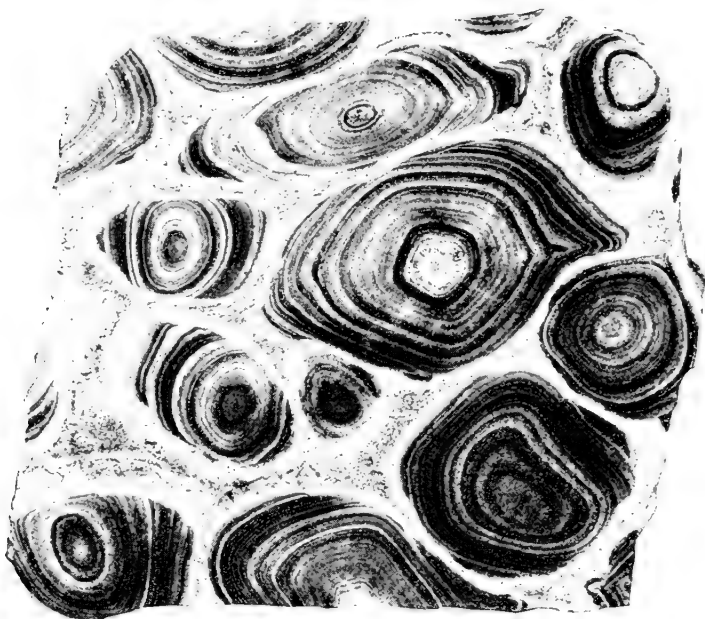
GENERAL VIEW OF EXHIBITS, DEPARTMENT OF GEOLOGY.



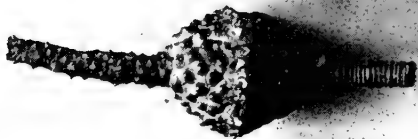
GENERAL VIEW OF EXHIBITS, DEPARTMENT OF GEOLOGY.



CONCRETIONARY STRUCTURES.



CONCRETIONARY STRUCTURES.

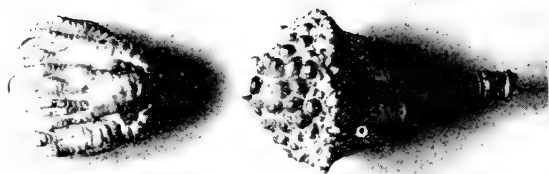


THE CROWN.

The crown consists of the *dorsal cup* or *shortly cup* (colored blue), the *tegmen*, sometimes called *disc* or *vault* (red), and the *brachia* or arms (yellow), which are generally provided with *plumules* (black), and often there is an *anal tube* (brown).

24,185. *Platystrophia hemisphaerica*. Lower Carbonic.
24,191. *Cyathocrinus multibrachiatus*. Lower Carbonic.

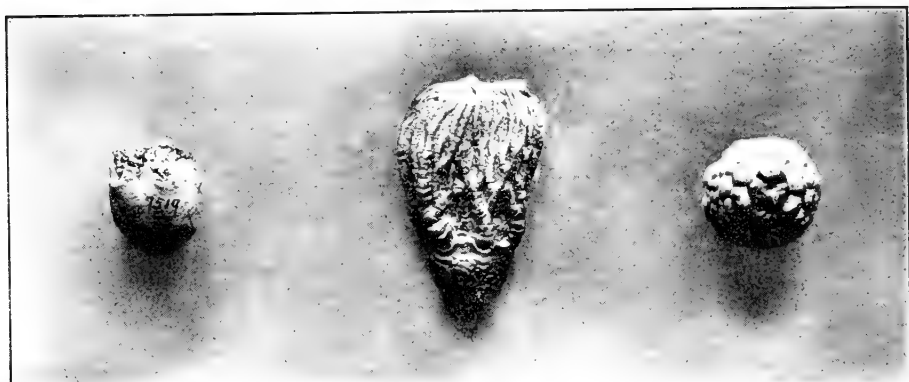
24,185. *Batocrinus wachsmuthi*. Lower Carbonic. The brachia are removed to show the tegmen and anal tube.



ENLARGEMENT OF THE SIMPLE DORSAL CUP.

The dorsal cup may be enlarged by the addition of *proximal brachials* (here colored blue), or by the insertion of a variable number of extra plates between the brachials. The latter are called *interbrachials* (colored red).

24,156. *Tasocrinus multibrachiatus*. Lower Carbonic.
24,163. *Batocrinus wachsmuthi*. Lower Carbonic.



THE DORSAL CUP.

The Dorsal Cup in its simplest form is composed of 2 or 3 circlets of 5 plates, those in one circlet alternating with the 5 in the adjacent circlet. Of these the most important are those that support the brachia and to them the term *radials* is restricted (colored blue). The interrarial plates below these are the *basals* (colored red), so called because in many crinoids they form the base of the cup and rest on the stem. Such crinoids are called *monocyclic*. In other crinoids a circlet of *infrabasals* occurs beneath the basals (colored yellow), and these, therefore, are known as *dicyclic*.

Primarily there are 5 plates in each circlet, but owing to the fusion of two or more of the proximal plates the number of basals in monocyclic forms may be reduced to 4, 3, or even 2, and the infrabasals in dicyclic crinoids to three.

The cup often has, in addition to the plates above described, supplementary plates known as *anals* and *interbrachials* which assist in enlarging the cup.

776. *Batocrinus longirostris*. Lower Carbonic. The cup plates not colored are the *interbrachials*.
 7519. *Platycrinus planus*. Lower Carbonic.
 24,191. *Cyathocrinus multibrachiatus*. Lower Carbonic.

CRINOID SERIES—THE DORSAL CUP.



THE TEGMEN.

The Tegmen in its simplest form is composed of 5 plates called *deltoids* or *orals* (colored red). There are nearly always present also *ambulacra* (colored blue), covering the food grooves or ambulacra that lead from the brachia to the mouth. In many Paleozoic genera the ambulacral plates are covered by the *internachal dome plates* (colored yellow). When the dorsal cup is enlarged by other plates than those of a simple crinoid the tegmen also introduces supplementary plates known as *interambulacra* (black). Finally the tegmen may be in the form of a coriaceous skin, in which large numbers of thin calcareous ossicles are embedded.

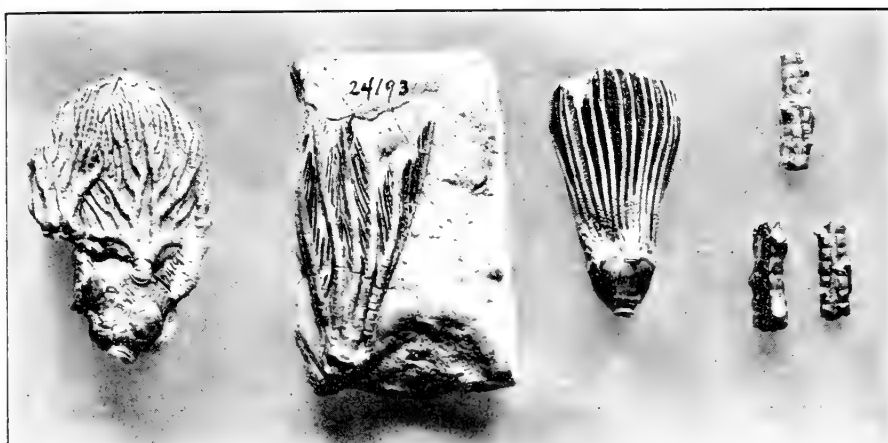
The mouth is nearly always covered by the deltoids or the dome plates while the *anus*, which is closed by a *calicular pyramid*, is often surrounded by, or raised on, small plates (colored brown).

24,185. *Platycrinus hemisphericus*. Lower Carbonic.

768. *Dorycrinus unicornis*. Lower Carbonic. The anal pyramid is not preserved.

775. *Bistocrinus elegans*. Lower Carbonic. The anal tube is broken away.

24,413. *Strotocrinus regalis*. Lower Carbonic. A natural cast of the interior surface of the tegmen showing the ambulacral grooves.

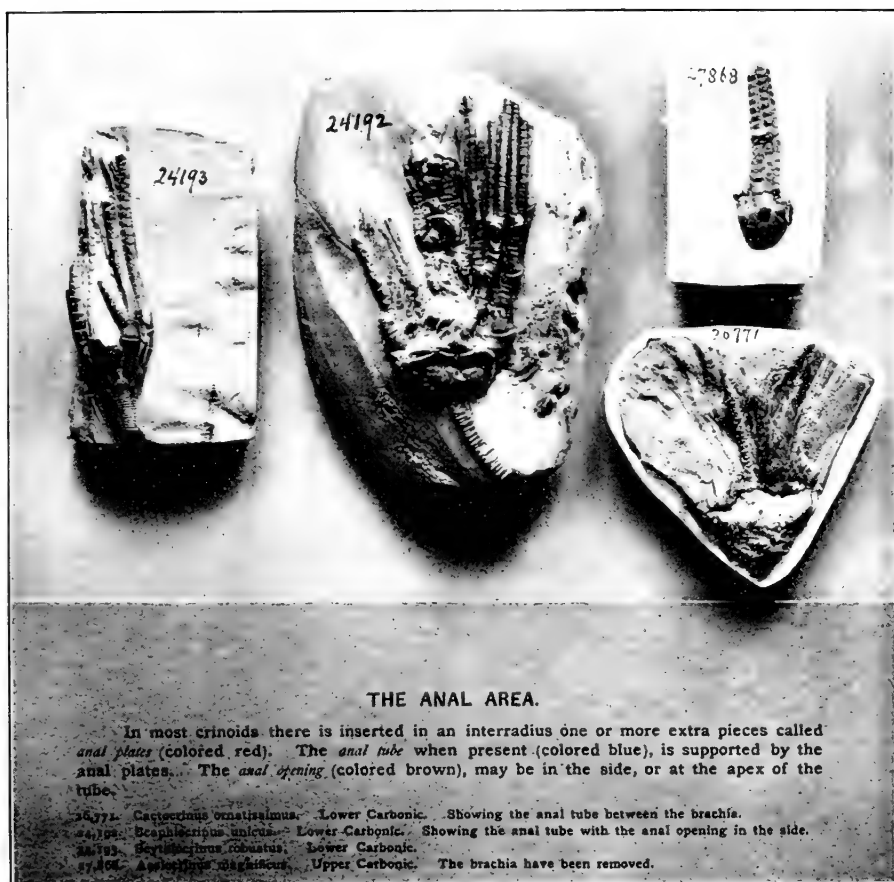


THE BRACHIA AND PINNULES.

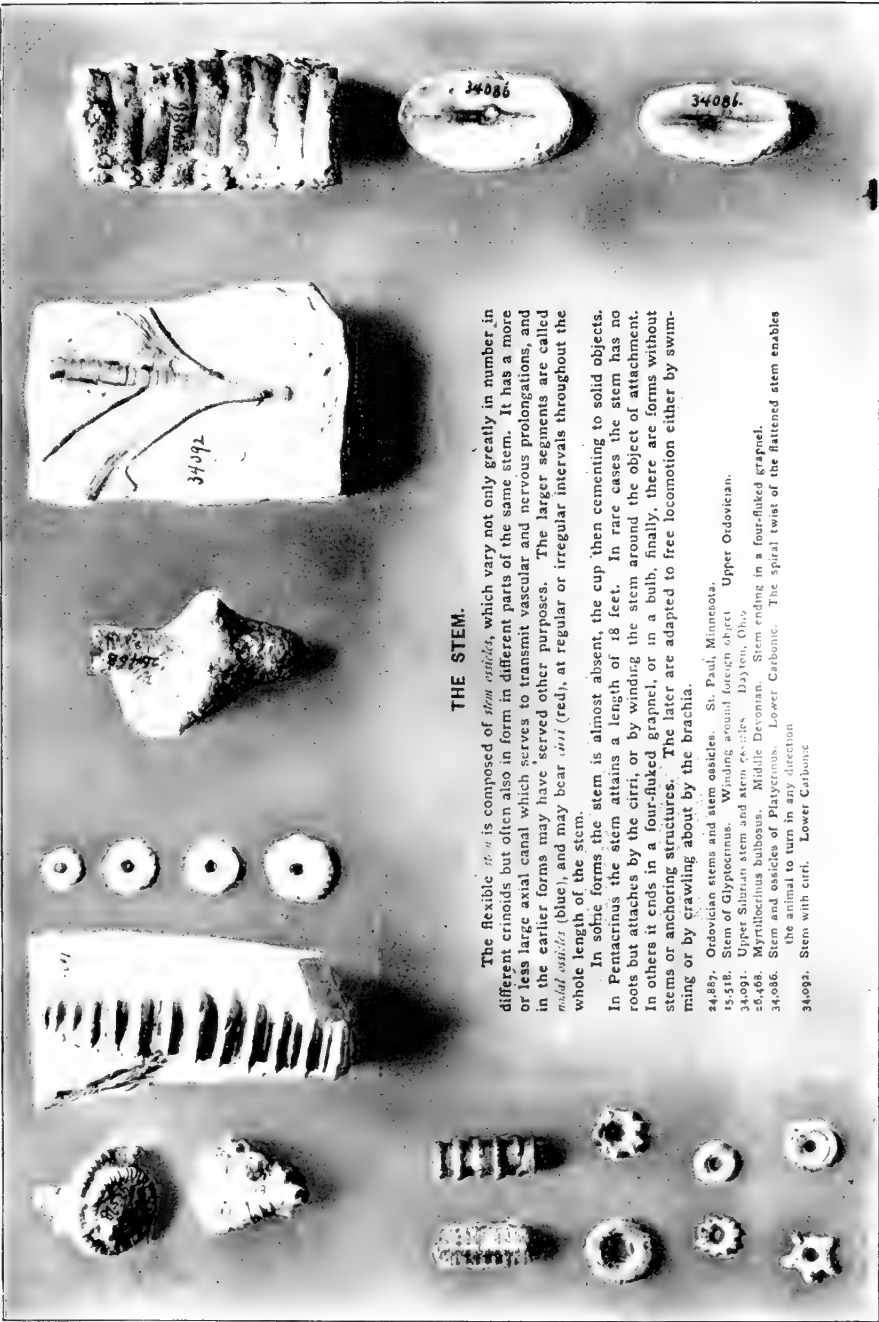
The Brachia or arms in their simplest form consist of a series of ossicles called *brachials* (colored blue), which continue straight up from the *radials* colored red). The brachials may be in single or alternating double rows; and hence are spoken of as *uniseriate* or *biseriate*. The inner surface of the brachia are grooved for the transmission of food laden water to the mouth and for the soft parts; and these are protected by covering plates called *ambularials* (yellow), which can open or close as occasion demands.

The brachia are rarely single, usually bifurcating in a regular or irregular manner at definite points. The *pinnule* (colored black) is a brachium in miniature; it differs in nothing but position from the small end-branches of a simple dichotomous arm. However, when the pinnules are regularly placed on alternate sides of successive brachials of the main branch, the arm is said to be *pinnulate*. To these pinnules are restricted the fertile portions of the genital rachis.

- 24,193. *Scytalocrinus robustus*. Lower Carbonic. Brachia pinnulate with regular bifurcations. Brachials in single columns.
- 34,087. *Platycrinus agassizi*. Lower Carbonic. Brachia pinnulate with regular bifurcations. Brachials in double, alternating columns.
- 24,191. *Cyathocrinus multibrachiatus*. Lower Carbonic. Brachia dichotomous, without pinnules.
- 24,155. *Barycrinus hercules*. Lower Carbonic. Pinnulate brachia showing the ambularial groove and ambularial plates.



CRINOID SERIES—THE ANAL AREA.



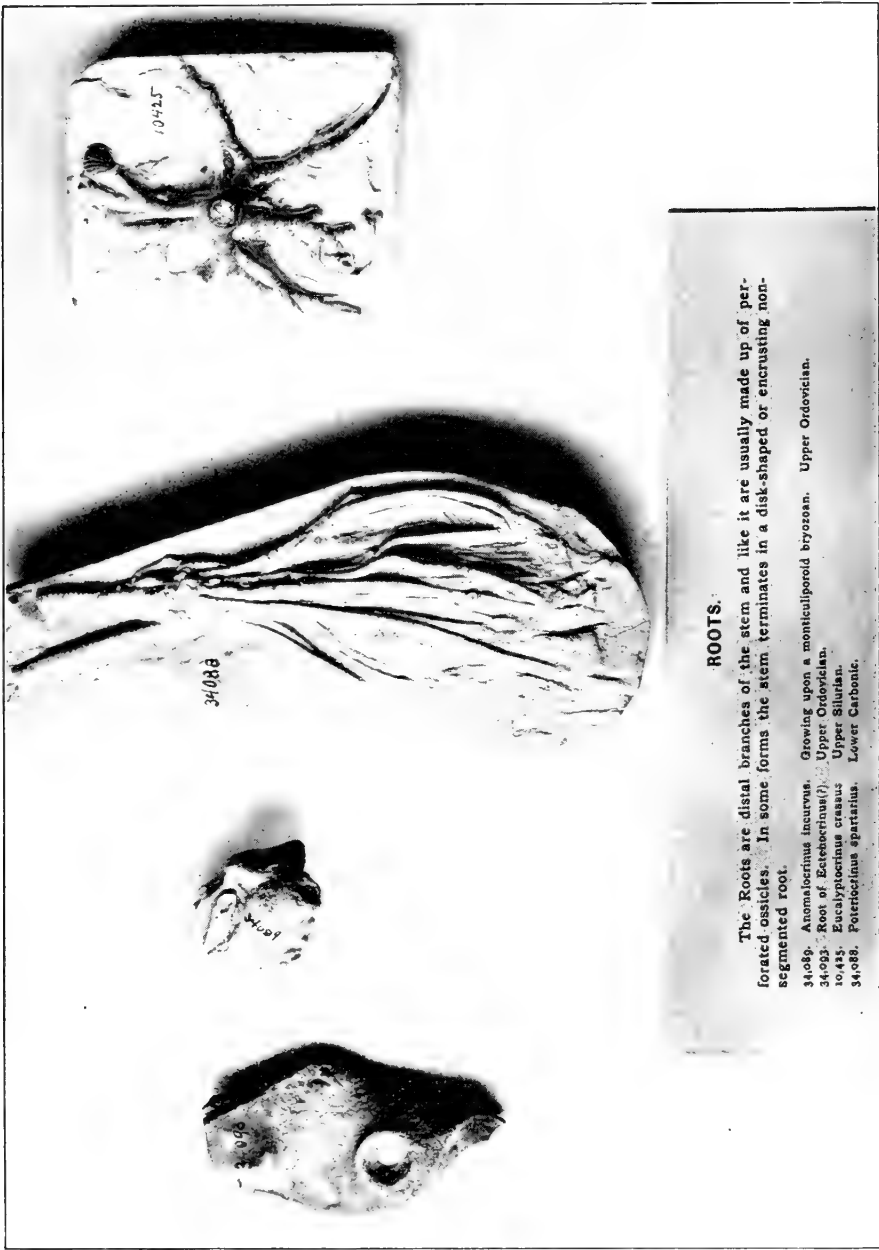
THE STEM.

The flexible *stem* is composed of *stem ossicles*, which vary not only greatly in number in different crinoids but often also in form in different parts of the same stem. It has a more or less large axial canal which serves to transmit vascular and nervous prolongations, and in the earlier forms may have served other purposes. The larger segments are called *major ossicles* (blue), and may bear *curli* (red), at regular or irregular intervals throughout the whole length of the stem.

In some forms the stem is almost absent, the cup then cementing to solid objects. In *Pentacrinus* the stem attains a length of 18 feet. In rare cases the stem has no roots but attaches by the *curli*, or by winding the stem around the object of attachment. In others it ends in a four-fluted grapple, or in a bulb, finally, there are forms without stems or anchoring structures. The latter are adapted to free locomotion either by swimming or by crawling about by the brachia.

- 24,887. Ordovician stems and stem ossicles. St. Paul, Minnesota. Upper Ordovician.
- 15,518. Stem of *Glyptocrinus*. Winding around foreign object. Dayton, Ohio.
- 34,091. Upper Silurian stem and stem ossicles. Dayton, Ohio.
- 26,468. *Mytilocrinus bulbosus*. Middle Devonian. Stem ending in a four-fluted grapple.
- 34,086. Stem and ossicles of *Platycrinus*. Lower Carbonic. The spiral twist of the flattened stem enables the animal to turn in any direction.
- 34,092. Stem with *curli*. Lower Carbonic.

CRINOID SERIES—THE STEM.



CRINOID SERIES—THE ROOTS.

CRINOID PARASITES.

Gastropods of the genera *Cyclonema* and *Platyceras* are found situated over the anal region of many crinoids. In the Silurian and Devonian such occurrences are rare and they do not appear to have been permanent parasites. In the Lower Carboniferous, however, the form of the shell is considerably modified and perfectly moulded to the crinoid, proving that the *Platyceras* spent its life where found. Its sustenance, therefore, must have been largely the effete matter of the crinoid.

15,513. *Glyptocrinus decadactylus*. The parasite is *Cyclonema bilix*. Upper Ordovician.

26,465. *Arthracantha punctobrachiata*. The parasite is *Platyceras dumosum rarispinum*? Middle Devonian.

24,185. *Platyceras hemisphericus*. Lower Carbonic. The parasite is *Platyceras unicum*.

CRINOID SERIES—CRINOID PARASITES.



HESPERORNIS REGALIS.



MODEL OF TRICERATOPS PRORSUS.



PAINING OF TRICERATOPS PRORSUS.

FLINT IMPLEMENTS AND FOSSIL REMAINS FROM A SUL-
PHUR SPRING AT AFTON, INDIAN TERRITORY.

BY

WILLIAM HENRY HOLMES,
Head Curator, Department of Anthropology.

LIST OF ILLUSTRATIONS.

- Plate 1. Site of Afton sulphur springs.
2. Discovery of a flint implement in the superficial sands.
 3. Difficulties met with in making excavations.
 4. Mammoth teeth found in the gravels.
 5. Section of spring and associated geological formations.
 6. Fragmentary condition of fossil bones.
 7. Mastodon teeth.
 8. Mammoth teeth.
 9. Mammoth teeth.
 10. Arrow and spear heads.
 11. Arrow and spear heads.
 12. Spearheads.
 13. Spearheads.
 14. Spearheads.
 15. Spearheads.
 16. Blunt-pointed spearheads.
 17. Well-worn knives.
 18. Knives.
 19. Symmetric blades.
 20. Roughed-out blades.
 21. Roughed-out blades.
 22. Roughed-out blades.
 23. Freshly sharpened implements.
 24. Antlerly implements.
 25. Antler implements.
 26. Bone implements.

FLINT IMPLEMENTS AND FOSSIL REMAINS FROM A SULPHUR SPRING AT AFTON, INDIAN TERRITORY.

By WILLIAM HENRY HOLMES,
Head Curator, Department of Anthropology.

INTRODUCTION.

During the summer of 1901 the attention of the Smithsonian Institution was called to a new site yielding fossil remains of the mastodon and mammoth and numerous flint implements in close association with them. The information was furnished by Dr. R. H. Harper, of Afton, Indian Territory, who, on making a superficial examination of the site, became convinced that the phenomena were of much scientific interest. Through his solicitation the National Museum took the matter up, and Mr. F. A. Lucas, curator of comparative anatomy, sent his assistant, Mr. A. Stewart, to make investigations, the particular object being to procure a complete skeleton of mammoth or mastodon for the Buffalo Exposition; but Mr. Stewart found that the parts of fossil animals at Afton were dissociated and fragmentary, and the investigation was abandoned after slight excavations had been made.

Owing to the report that relics of human handiwork were found associated with the fossil remains, I resolved to visit Afton and make investigations. Setting out for the West on September 26, I stopped a few days at St. Louis to visit the fossil mastodon beds at Kimmswick, 25 miles south of the city, and, in company with Mr. C. W. Beehler and Mr. T. D. Townsend, who are interested in the property and engaged in its exploration, spent a very instructive day at the site. The question of the association of human remains with those of the mammoth and mastodon has been raised at this place also, but up to the present time the evidence collected is not at all conclusive. It is believed that the bones found, which so closely resemble the humerus of man, may be portions of the fibulae of young mastodons, and that the flint implements reported as occurring with the fossil remains may have been recently introduced, since identical forms are plentiful on the surface of the site. At any rate, it seems wise to suspend judg-

ment in the case until more critical and exhaustive studies have been made. Resolving to return at an early date and make fuller examinations, I hastened on to Indian Territory.

THE SPRINGS AT AFTON.

The village of Afton, Indian Territory, a station on the St. Louis and San Francisco Railway, is in the midst of a plain which occupies the angle between the Arkansas River and its northern tributary, the Neosho or Grand River. The former stream enters the Territory from Kansas on the north, flowing southeastward and passing into Arkansas at Fort Smith, while the Grand rises in southeastern Kansas and southwestern Missouri and flows southward across the plains, joining the Arkansas in the Cherokee Nation, 45 miles south of Afton. Forests grow along the more rugged bluffs and on the occasional low hills, but the general region is almost treeless. The country is now very well settled, and farming and grazing are carried on with success.

The geologic formations underlying the immediate region of Afton appear to be of Carboniferous age, the strata being approximately horizontal, but they are much obscured by superficial deposits save in the banks of the rivers and their larger tributaries.

The springs with which the fossil remains and artifacts were associated are in a shallow wash at the very head of one of the lateral branches of Horse Creek, a tributary of the Neosho which falls into it from the north. The wash has no water, and has probably never carried a stream save in times of heavy rainfall or as a result of the melting of snow in the spring. In summer the water of the springs sinks from sight a few hundred yards from the source. The wash, which ramifies in various directions, is in places 200 feet wide and has a level floor only slightly depressed beneath the surface of the surrounding prairie. In this flat space the water of the springs, spreading out, forms a marshy area an acre or more in extent, which is much trampled by cattle when they have access to it, as it doubtless was at an earlier date by herds of buffalo and possibly by greater mammals that went before them. The surface is soft and spongy, sinking beneath the feet, and in approaching the basin of the principal spring it was necessary to lay down boards to insure a footing. The photograph (Plate 1) conveys a good idea of the appearance of the spring with which we are mainly concerned and of the general surroundings. The upper ends of the rough boards of the box forming the spring basin appear above the surface of the marsh. Besides this large spring, a second very weak spring occurs some 40 feet to the west, and a third, a little stronger, rises in a side wash perhaps 150 yards to the northeast. The water rising in the principal spring flows

so strongly that it requires quite steady dipping on the part of a single workman to keep the flow down. It is clear and so slightly impregnated with sulphur that it is used by the people of the vicinity for drinking purposes. The flow is steady, not changing winter or summer, a fact which indicates the great depth of the source—probably in the reservoirs from which the artesian water of the region is obtained.

TRADITIONS REGARDING THE SPRING.

In the neighborhood of Afton the relic-bearing spring has the reputation of possessing unusual medicinal qualities, and it is said that the aborigines of the region were formerly in the habit of gathering from all directions and camping near it for the purpose of drinking the water. This tradition refers, apparently, to the Cherokees; but since these people are recent arrivals in the West and appear to have no definite knowledge of the matter, I was inclined to believe that the tradition related to the tribes who preceded them in the Indian Territory, and that the qualities of the spring were not medicinal, as we understand the term, but were magical—such qualities as are commonly associated with sources of water supply by primitive peoples. This point will receive attention later. Careful search in the vicinity of the springs failed to bring to light even the most meager traces of aboriginal occupancy.

FIRST CLEARING OUT OF THE SPRING.

At an early date a barrel was set into the soft ground to receive and retain the water, and about fourteen years ago this was superseded by a strong box, but as the boards were sharpened and driven down the deposit of flints in the spring was not seriously disturbed. Later a new box was set inside of the old one, and in the cleaning out of the reservoir many implements and bones were found. It is said that at that time a bushel or more of the flints were thrown out and distributed among various persons.^a It is much to be regretted that none of these have been preserved. Subsequent cleanings out yielded additional implements, and in the summer of 1901 Dr. Harper obtained about 150 specimens and some fossil teeth, which have been presented to the Smithsonian Institution. In June, 1901, Mr. Stewart visited the place and made the slight excavations already referred to, but did not penetrate deep enough to discover the deposit of implements.

^aIt should be noted that the stories relating to this period of the history of the spring vary considerably.

FINAL EXAMINATIONS. "

Having procured workmen and supplied myself with all necessary tools and appliances, I built a long trough to carry the water well away from the spring, and at once began the work of bailing out the basin. The box was about 4 feet square, and made of heavy boards held in place by timbers on the inside. About 4 feet from the surface of the ground silt was encountered, then sand and fine gravel, with which came up teeth of small mammals and an occasional mammoth tooth, also some flint implements, the number increasing as descent was made. When comparatively firm gravel was reached, at 5 or 5½ feet, the teeth and flints were found in great abundance, and the shovel, which was now brought into use, when inserted beneath the lower ends of the boards at the northern side came out half filled with the handsome blue and white spear points and knives, and along with these were bones of horses, deer, buffalo, and wolves. A little further excavation beneath the northern margin of the box brought to light the head of a buffalo and antlers and bones of two or more deer. In the deposit were also a number of implements made of deer antlers, which resemble very closely the hammers and pressure-flaking implements used by the tribes of the region in shaping flint.

The spring box, now being without sufficient support on the inside, collapsed, letting in the beds of soft muck and sand. It thus became necessary to make excavations outside of the spring basin sufficiently extensive to enable the workmen to clear away the wrecked box and provide against further caving in. When the superficial muck, which was about 2 feet in thickness, was removed from a considerable area, it was found to have rested on the surface of a bed of compact and extremely fine sand, which was quite firm save about the spring box, where it had been disturbed by the original cleaning out of the spring and by the slight excavations of Mr. Stewart. In the muck nothing excepting a few fragments of bones of buffalo were encountered, and there were only occasional specimens in the sand beneath. The discovery of a large spear point in the sand at a depth of 3 feet from the surface of the ground was a surprise. Plate 2 shows the implement as it appeared at the point of the shovel. This was about 3 or 4 feet north of the northern side of the box as it originally stood. Since this locality was undoubtedly a resort of the buffalo for a long period, instances must now and then have occurred of the death of wounded animals whose bodies contained the missiles shot into them by hunters, and in this way it is easy to account for the finding of stray spear

"My thanks are due to Dr. Dawson, owner of the property, for the privilege of making excavations. I must add, also, that most valuable aid was given in the work of excavation by Mr. DeLancey Gill, of the Bureau of American Ethnology, who accompanied me on the trip.

points, and these naturally would occur at depths in the formations as great as were reached by the bones of the animals themselves.

Half a day was consumed in getting rid of the wrecked box and clearing out the muck and water, the difficult nature of the work being well indicated in Plate 3. A pump was used to remove the water, and the work was kept up all night to prevent flooding; but on the second night the pump failed and the whole place was soon under water, which caused much delay. Reaching finally the level of the flint deposit in the spring, we began to encounter the implements again and took out a hundred or more, besides additional bones of the buffalo, elk, deer, and wolf. The finding of the flints was under such conditions of water encroachment and deep shadow that it was not possible to obtain photographs; but this seemed of little consequence, as the specimens did not occur in any particular order. They were piled together as if deposited, mainly at least, at one time, in the mouth of the spring. Most of them had descended to a depth of from 4 to 7 feet, and with the exception of a few stray pieces, such as those already referred to, they were included in a space not more than 3 feet in diameter. In this cluster were also most of the modern bones as well as many of the ancient animal remains. At a depth of 7 feet there were no more flints, but occasional teeth of the horse occurred along with the great teeth of the mammoth. The illustration, Plate 4, shows our party working in the wet gravels at a level only a few inches below the lowest flints and a little to the north of the position of the main deposit. Two fine mammoth teeth are in sight in the view, and the teeth of a recent horse were found a few inches behind the tooth held in the right hand of the workman in the shadow. Work was continued long enough to make sure that there were no more flints, and some time was spent in adding to the collection of fossil teeth. Before the excavation was filled a new box, 4 feet square and 7 feet deep, was set in the spring, and we had the pleasure of seeing the bubbling water rise in it as the work of filling went on around it.

THE FORMATIONS.

Other excavations were made at various points, with the view of determining the nature and extent of the formations. After our departure from Afton, Dr. Harper, working under my instructions, sunk three pits—one, north of the spring, 20 feet long and 13 feet deep, which practically connected with the original excavation; a second, 11 feet deep, 25 feet west of the spring, and a third, 9 feet deep, south of the spring and 25 feet away.

The section (Plate 5) shows the geological formations, together with the position and relations of the various finds of bones and implements. It is clear that the deposits of sand and gravel are not local, pertaining exclusively to the spring or even to the spring group, but

that they occupy a considerable area, as if deposited in a large body of water or by a river of considerable size. Our deepest excavation penetrated to a depth of only 13 feet, but the sounding rod indicated at least 16 feet of finely comminuted deposits. There is, however, considerable irregularity in the thickness of the several formations examined. The muck bed, which is 2 or 3 feet deep in the vicinity of the springs, gradually changes to sandy loam as the margins of the wash are reached. This muck represents merely the depth of disturbance by the feet of cattle and the consequent interference with free drainage of the water, the growth of marsh vegetation being the result of the constantly moist condition of the trampled area. The bed of sand beneath the muck has an approximately level upper surface, but is not of uniform thickness. It is 3 or 4 feet thick at the spring, and 10 or more 20 feet away. In the upper part it is extremely fine in texture, but lower there are layers of fine gravel, and Dr. Harper reports, as a result of his examinations, that the sand and gravel are distinctly bedded as if laid down in water. The gravel consists almost wholly of chert, and is in the main finely comminuted, but not uniformly waterworn. Many of the pebbles, and even some of the fossil teeth, are coated completely with sulphide of iron, which gives the effect of gilding.

FOSSIL REMAINS.

Our examinations developed the fact that the fossil remains were much more numerous in the spring and near it than elsewhere. There were more mammoth and mastodon teeth within a radius of 3 feet from the spring basin and between 4 and 7 feet in depth than in all the other material examined. In this restricted area there were at least 100 mastodon teeth and perhaps 20 mammoth teeth, besides considerable numbers of teeth of fossil bison and horse, as well as the whole deposit of implements and recent bones. In the excavation north of the spring, 20 feet long, 4 feet wide, and 13 feet deep, not half a dozen teeth of all varieties were found. In all the excavations outside of the spring the distribution of fossil remains was apparently quite uniform throughout the sand and gravel. Some of the teeth were perfectly preserved, while others were so disintegrated as to fall to pieces on being touched, and fragments were common and presented the appearance of attrition from water transportation.

In seeking an explanation of the prevalence of mastodon and mammoth teeth in the spring, several surmises may be made. Possibly, if the spring is very ancient, the great pachyderms mired more frequently in its basin than elsewhere, leaving their bones in the muck. Possibly the spring funnel was, in comparatively recent times, a receptacle for such bones as were weathered out of neighboring formations and carried by water or by gravity into the opening; and possibly movements of the soft deposits, on occasions of particular disturbance

or of strong pressure from beneath, have been toward the points of least resistance at the spring. The finely comminuted materials, the sand and clay, would be carried away by the strong flow of water, and the great teeth and the coarse gravel would remain in the basin. At least one instance was observed of such movement in the deposits near the spring. A year or two previous to my visit to Afton, and during the wet season, a body of liquid and semi-liquid material suddenly broke through the surface of the ground near the spring, like a bursting bubble, leaving a little hillock which is still distinctly visible. Such movements may have occurred from time to time, the direction being horizontal and toward the spring or directly or obliquely upward.

But perhaps the most plausible theory that can be advanced to account for the accumulation of bones in the spring is that when the place became an object of special attention on the part of the native tribes, such bones as were exposed in the vicinity were gathered and cast in as appropriate offerings to the beings supposed to inhabit it. This suggestion is strengthened by the fact that the ancient bones are more plentiful in exactly the area in which the bones of modern creatures and Indian implements are found. Indeed, it is not improbable, as has been elsewhere remarked, that the occurrence of these huge bones gave rise to the superstition in the native mind that powerful spirits made this their dwelling place—that the spring was the doorway to the realm beneath. The remains of recent forms occurred nowhere at a depth of more than 4 or 5 feet, except in the immediate vicinity of the spring funnel, where they were deeper, and the teeth of a modern horse were, as has been stated, found associated with mammoth teeth at a depth of 7 feet.

It is clear that in the formations outside of the spring remains of the ancient creatures are quite uniformly distributed, and it appears that everywhere they are fragmental, the bones being separated and broken up as if subjected, at some past period, to vigorous transportation by water or to crushing under the feet of monsters trampling in the muck. In some instances two or more teeth were so related as to show that they had been in place in the jawbone when carried to their present position.

The remains of tusks were also fragmental, and in all cases in a state of disintegration so advanced that only small portions could be saved. The bones are broken with a sharp fracture, as if already brittle from decay or silicification when the disturbing agencies were active. Examples are illustrated in Plate 6. In the neighborhood stories are told of the discovery about the spring of bones of great size, but the largest piece encountered in our excavations was half of the lower jaw of a mastodon. Plate 7 illustrates a number of mastodon teeth, the one shown in *c* being of unusual shape, the result probably of disease.

Mammoth teeth are shown in Plates 8 and 9. The largest, a lower tooth, 16 inches in length, appears in Plate 8, while the larger of the

specimens shown in Plate 9, an upper tooth, is 11 inches in length, and very massive. Mr. Lucas, observing the differences between the two specimens shown in Plate 9 (the one being finely and the other coarsely ribbed), expresses the opinion that they may possibly represent two varieties of mammoth—*Elephas primigenius* and *Elephas imperator*, the latter species, proposed by Leidy, not as yet having been generally accepted.

Associated intimately with the flint implements in the spring were bones of two or three buffalo, four or more deer, one elk, half a dozen wolves, and one or more horses. These were a little more widely distributed than the flints, but were distinctly a spring deposit, and it is not unlikely that their presence also was partly or wholly due to human agency.

STONE IMPLEMENTS.

The implements found in the spring had been subjected to so much disturbance before my arrival that the exact nature of the original deposit could not be determined. They were in compact order, as if dumped in a body, but much the same result would have followed from the casting in of single specimens or small lots at various times, since all would settle to the deepest possible point in the spring basin, the position and character of which has probably remained unchanged for a long period. It is impossible to say whether or not the native tribes ever took the trouble to excavate the basin, either for convenience in using the water, to increase the flow in dry seasons, or to facilitate the introduction of the implements; but if the objects deposited were, as we suppose, in the nature of offerings, the spring was a sacred place and no one would venture to disturb it under any circumstances.

It was noted that the remains of buffalo, deer, and wolf were intermingled with the implements and that they were not associated as though the animals had died on the spot, but rather as if the separate bones or dismembered parts of the creatures had been thrown in with the implements. I am inclined to the view that they were cast in as offerings, since there seemed to be a very large and disproportionate number of bones of one kind; for example, not fewer than twenty or thirty of the large, straight leg bones of the deer were associated directly with the flints.

If statements coming from apparently reliable sources be correct, more than half the deposit of implements had been removed before my arrival. I obtained altogether, counting fragments and partially shaped pieces, more than 800 specimens, not quite half a bushel, so that there must have been at least a bushel (some say a barrel) of implements in the original deposit, the number reaching somewhere between 1,500 and 2,000. They include arrowheads, spear points, knives, and unspecialized blades, besides some roughed-out forms and

unshaped fragments. All the implements were shaped by flaking, and the work was for the greater part exceedingly well done. The finished forms appear to be such as would be appropriate to the buffalo hunter equipped for the chase. The spear was, it is believed, the main reliance of the Great Plains hunter, but bow and arrow were also in general use, especially for the smaller varieties of game. To pierce successfully the tough hide of the buffalo and penetrate to a vital part, the projectile point had to be thin, long, and incisive; the sulphur spring has furnished many perfect specimens of such implements (Plate 13). Our museum collections contain nothing comparable with them, and, except such as were probably broken by our excavating tools, nearly all are in perfect condition, as if just from the finishing shop. It is a noteworthy fact that a large number of the spear points, as well as the knives, had been freshly sharpened when the deposit was made, the old discolored surface being easily distinguished from the more recently chipped portions (Plate 22).

The knife also, of which there are many specimens, was of primary importance to the hunter. The thin blades are from 3 to 6 inches in length and from 1 to 4 inches in width, and show various stages of specialization and wear. Many are, apparently, freshly made, symmetric, leaf-shaped blades, while others have been sharpened and resharpened on one side so as to be scarcely more than half the original width (Plate 17). One end of the blade is in all cases wider than the other, and, taking the narrow end as the point of the implement, the sharpening is such as to indicate a right-handed use in nearly all cases.

The chert of which the implements are made is of excellent quality; it is white and bluish-gray in a majority of cases, but some specimens are quite dark. It is not of the variety found so plentifully in the quarries of the region about Afton, but is of finer grain. The quarries 4 miles south of the village, as well as those on the Peoria reservation, 25 miles to the northeast, furnish a coarser material, generally somewhat yellowish in color. It is manifest that the flint is nearly all from a single quarry or from a group of sites yielding identical material, and there is no doubt that these quarries will be found in good time not far distant from the Afton Springs. A very few pieces are of other varieties of flint, such as are sometimes found scattered over the surface of the country, and some of these may have been brought in from distant points.

Owing to the unusual interest attaching to this collection, I deem it wise to present a full series of illustrations. The objects are shown actual size or as nearly so as circumstances permit. Plates 10 to 16 are devoted to arrowheads and spear points, the two classes being placed together because it is quite impossible to draw the line separating them. We assume that the smaller forms (Plate 10) were

generally used as arrowheads and the larger ones as spear points. The groups assembled in the plates are, as far as may be, representative of different types.

In Plate 13 examples of large, superbly finished spear points are presented. They represent the highest and most prevalent type of these objects, having long, thin blades, prolonged acute points, and deep notches separating the stem and the wings. Plate 14 shows less typical examples of the same general shape. Plate 15 shows five examples of spear points of unique form, very probably made especially for sacrificial purposes. They are wide and thin, and are characterized by an almost rectangular body, an abrupt triangular point, a wide, square base, and concave lateral margins. Hardly less remarkable are the roundish, blunt-pointed spear points shown on Plate 16. The deposit did not contain more than a dozen of these unusual implements, and nothing resembling them is found in the Museum collections. It may be suggested that they possibly served in the ceremonial shooting of spirits.

Plates 17 and 18 illustrate knives that have been specialized in various degrees. Examples of the smaller unspecialized leaf-shaped blades are shown in Plate 19, and specimens of medium size appear in Plates 20, 21, and 22. Plate 23 illustrates four rudely outlined discoidal blades, while other still ruder specimens, not included in the plates, probably belong to the class of failures or rejects.

One of the most striking features of these implements is that many of them show distinct evidences of recent reshaping. The old surfaces are quite dark, as is well shown in Plate 22, while the new flaking has exposed the clean white material. Many arrowheads and spear points have been retrimmed, some slightly, others over a large part of the surface (*a*, *b*, and *c*), while the knives have been carefully sharpened along one edge, as is seen in *d* and *e*. It is interesting to note that the sharpening occurs on the left side of the blade, indicating right handedness of the owners. Strangely enough, there were many fragments and chips of chert scattered through the spring deposits, as if work had been done on the spot or near at hand, and the flakage thrown in along with the shaped objects. Traces of what appeared to be arrow shafts of reed were also found.

BONE AND ANTLER IMPLEMENTS.

The bone implements were not at first recognized as such, and probably many were thrown away, being taken for mere fragments of bone. There are three varieties of these objects—two made of antler and the other from leg bones of deer and birds. The most numerous are from the heavy end of the antler; their length varies from 4 to 7 inches.

The base retains nearly its natural form and the other end is slightly rounded off, as is shown in Plate 24. These objects are of the type known as flint flakers in the Middle West, and were probably supplied with handles fastened about the middle portion, making them available for roughing out the flint blades by percussion.

A second form is such as would be produced by dividing longitudinally the implement described above and rounding down the ends and edges. Examples are shown in Plate 25. They were associated with the flint knives in such an intimate way as to lead to the supposition that they may have served as handles. They could have been set together in pairs inclosing the upper edge or back of the knife blade and lashed or cemented firmly in place. In two or three cases pairs were found so nearly matching in size and curvature as to allow successful employment in this way. It is to be noted that these objects are very like implements used in some regions for pressure flaking in the final trimming and sharpening of flint implements. Such implements would naturally form a part of the set of tools carried by a hunter of the Stone Age when about to set out on a prolonged expedition.

Among the many partially decayed objects of bone there were specimens resembling awls; two of these appear in Plate 26. The larger is made of one of the lower leg bones of deer or antelope, and the smaller of the leg bone of some large bird—a heron or a sand-hill crane. Such utensils were an essential feature of the outfit of the lodge dweller of the Great Plains, whose clothing and dwellings were often made of skins sewed together.

SIGNIFICANCE OF THE DEPOSIT.

As has been indicated, the conclusion was reached at the outset that the casting of implements into the spring was not a caching or hiding of these precious objects, much less an idle, meaningless act. Stone implements were the most important possessions of the hunting tribes. Stone was their iron and steel. A vast amount of labor was expended in digging it from its bed in the hills and in reducing it to the forms desired, a work necessarily performed by men possessing particular skill. The placing of these articles in the spring must, therefore, have been an act of great importance to the people concerned, and was doubtless in response to the demands of superstition. Water, and especially sources of water supply, have ever been regarded by primitive men, and even by some more advanced peoples, as dwelling places for spirit beings, and when sacrifices were believed to be necessary, the most precious possessions were cast in, and no one was sufficiently bold to molest them. In fact, such a spot was generally regarded as sacred, and was avoided by all save those who were properly qualified to

approach and make the offerings—the medicine men or priests. One of the most striking facts connected with the Afton spring is that, although tradition indicates that it was a great gathering place for the native tribes, no traces of camps or dwellings were found in the vicinity.

That sacrifice to spirit occupants of springs was a widespread practice among the tribes of the West is clear, although observations of the fact are somewhat rare. Dr. J. Owen Dorsey tells us that the Dakotas believe the buffalo to be of subterranean origin, and refers to a tradition which asserts that one day when a principal man of one of the tribes was fasting and praying to the Sun god he saw the ghost of a buffalo rising from a spring.^a The Sioux have also water gods and mystic beings associated with bogs.

In a recent publication by Dr. A. S. Gatschet reference is made to a sacred spring or well of the Omahas, located in western Kansas, as follows:

This curious water receptacle is situated on the top of a hill, and has a nearly circular form with about 30 feet diameter. All the hunting tribes of the prairie regarded it with a religious interest mixed with awe; the Páni called it, or call it still, Kitch-Wálushti; the Omahas, Ní-wáxube, both names signifying "sacred water." The miraculous quality of this pool which chiefly astonishes the Indian mind, consists in a *slow rising* of the water whenever a large number of people stand around the brink. The water of the pool is perfectly limpid and considered to be bottomless; it harbors an aquatic monster which engulfs all the objects thrown into it, and never sends them up again. Indians offered to it beads, arrows, kerchiefs, earrings, even blankets, and all sink down immediately. Before putting clay or paint on their faces, the Indians impregnated these substances with the water of the well. They never drink of this water, but to allay their thirst they go to the neighboring Salomon River. Before buffalo hunting became a thing of the past, large hunting parties of natives often gathered around this pond-source, and the following narrative circulated among them as a truthful report of what really occurred: Two Pánis once returned with their horses. Having dismounted near the sacred water, one of the men stepped upon a turtle of the large species frequently found in the vicinity, about 3 feet long. The man's feet stuck to the turtle; he could not disengage himself from its treacherous shell, and when the turtle ran with his charge into the pool, the Indian was soon beyond possible rescue. His stupefied companion had seen the occurrence and went home to tell the tale.^b

PEOPLES CONCERNED IN THE DEPOSIT.

The Afton region was occupied by tribes of Siouan stock, and particularly by the Osages, who in historic times overran Neosho Valley and neighboring districts. That it was some of these people who cast the offerings into the spring seems highly probable from the fact that the whole group of artifacts was just such as they would have used before the introduction of iron, and facts brought out by recent

^aJ. Owen Dorsey, Eleventh Annual Report of the Bureau of Ethnology, 1894, p. 538.

^bA. S. Gatschet, Journal of American Folk-Lore, II, 1899, pp. 68-69.

correspondence with the Indian agent for the Osage tribe make it certain that they alone were largely, if not wholly, responsible for the deposit.

The following paragraph is quoted from a letter from Mr. O. A. Mitscher, Indian agent at Pawhuska, Indian Territory, to Dr. R. H. Harper, of Afton, who had written making inquiries:

SIR: Referring to your letter of the 7th instant relative to a certain spring located between Afton and Miami, in which were found numerous large teeth, about five hundred arrow points or spearheads, etc., asking me to learn from the Osage Indians what, if anything, these signified, I have the honor to report that I submitted this matter to old man Red Eagle, the oldest man in the Osage tribe, who distinctly remembers the spring, and states that it used to be the meeting place of the old medicine men of the tribe when he was a young man; that the spring was held as a sacred place, and the doctors met there to hold their councils.

The arrow-points or spearheads were worn by the medicine men as medals. It was the custom of the tribe to offer the spearheads and other tokens to appease nature or their gods by depositing them in the spring, which they considered holy ground. This custom was observed whenever the tribe went on the warpath, to insure victory; when a child was born, to secure blessings for the child; and for any unusual undertaking, to make it successful. These deposits of tokens in the springs were also good-luck offerings.

The spring was usually a shrine resorted to by the old-time Indians to commune with the unseen world. This custom, however, is not now in vogue, and has not been practiced by the Indians for some time.

I am assured by Red Eagle that when he was a boy, and before the white people intermingled with the Indians, it was the practice of the medicine men and the leaders to gather at these springs for the purpose of holding councils, etc.

Some of the tribes farther west seem to have had similar practices, and instances of sacrifice to springs are recorded. Mr. F. H. Cushing and Dr. Walter Hough report the ceremonial use of springs in various localities, and Mr. Thomas Ewbank speaks of a sacred spring near Zuni, New Mexico, as follows:

The spring is cleared out every year, when an offering is made to the spirit of the font of one or more waterpots, which are placed on the wall. A dozen or more whole ones were observed, while fragments abounded. Some of the remaining vases are reputed to have been offered centuries ago by the pueblo caciques. Specimens were brought away, notwithstanding the tradition that whoever abstracted one would be struck by lightning. As the Zuni Indians do not have recourse to artificial irrigation, they depend entirely on rain; and it is their belief that if they neglected the annual ceremonies at the spring their crops would be destroyed by drought."

Early in 1893 some Navaho Indians brought to Mr. T. V. Keam, the trader at Keams Canyon, in northeastern Arizona, several specimens of antique pottery which they had uncovered while digging for water at a point about 5 miles from the trading post. Mr. Keam had the Indians continue the work, with the result that in the course of a week's digging they unearthed several hundred specimens of ancient

"Ewbank, Report on Indian Tribes, Pacific Railroad Surveys, III, 1856, pp. 44-45.

pottery. Mr. James Mooney, of the Bureau of American Ethnology, published the following statement relating to these finds:

On Sunday, February 12, in company with Mr. Keam, I rode over to the spot where the discovery had been made. It is in a *rincon*, or side canyon, walled in by steep cliffs perhaps 150 feet in height. Toward the south the canyon opens out into an extensive valley occupied by several families of Navajos with their herds of sheep and goats. At the north end of the canyon several springs ooze up through the rocks and sand drifts, and it was in excavating one of these that the discovery was made. Several springs have now been dug out, but pottery has been found only at one. On climbing the steep ascent to the top of the mesa we find the remains of the ancient pueblo overlooking the valley on the east. It must have been an extensive settlement in its day, as large as any of the existing Hopi villages, as the ruins cover an area of perhaps 4 acres, and the whole neighborhood is strewn with fragments of stamped [coiled] and painted pottery and flakes of flint and obsidian. The foundations of the walls are still well preserved, so that the outlines of the room can be distinctly traced, and by digging out the accumulated sand and débris it is probable that nearly the whole ground-plan might be restored. At the foot of the cliff, toward the south, traces of burnt clay and charcoal show where the pottery was made, and the steps cut into the rock by which the ancient inhabitants descended to the spring are still plainly visible.

Several of the Indians were at work digging while we were there. They had excavated the principal spring, where the pottery had been found, down to bed clay, and had thrown the loosened sand out at the top. The instruments used were their hands and two long-handled shovels. The ground all around was strewn with fragments of pottery thrown out, and numerous other fragments were embedded in the sand. It was evident that probably half the original number, including the largest specimens, had been destroyed in the digging process. By working in from the side, instead of from above, and proceeding carefully to remove the sand with the hands and some such small tool as a knife or a stick, probably three hundred or more pieces might have been taken out intact. Most of those preserved were small, finely decorated with designs in black and reddish brown, and of most unique shapes. . . .

. . . According to the statement given to Mr. Keam by the Hopi, who have occupied this region from time immemorial, the ruined pueblo, which they call Kawaka, was formerly occupied by the Indians now in Laguna pueblo, west of the Rio Grande. They state also that their ancestors used to deposit jars and bowls near springs as votive offerings to the water gods. This would account for the fact that the vessels were all found close together at the principal spring, and appear from their size and shape to have been intended for religious rather than practical purposes. The custom of making offerings at springs to the water deities is common to all primitive tribes, and among the Arapahos and Cheyennes I have myself seen shawls and strips of calico hung up as sacrifices upon the bushes about every little watering place in the vicinity of a regular camp."

Recent correspondence with Mr. A. R. Graham, of Ferro, New Mexico, has brought to my attention the discovery of an offering spring at Hudson, New Mexico, and the following interesting paragraphs are quoted from his letter of January 18, 1902:

The Hudson hot spring (now called Faywood) is situated at the foot of a mesa 4 miles west of the Rio Mimbres, 25 miles due east of Silver City, this county, and about the same distance from Deming, New Mexico. It is directly on the old California highway, called the Santa Fé trail, and was used for many years prior to the

coming of the railroad in 1884 as a stage station, being the first station west of Cooks Peak Canyon, famous for its numerous hold-ups and Indian massacres in the early days.

The very high medicinal virtues of the waters were first discovered by Richard Hudson while serving as colonel of California volunteers in 1863. He located at the spring after being mustered out, and held possession until 1894, when I purchased the property. The flow from the spring then came from a cistern-shaped hole in the center of a round-top mound, elevated about 30 feet above the surrounding surface.

The regular flow of the spring is 5,000 gallons per hour, and it never, to my knowledge, varies from this. I purchased the property for the purpose of establishing a health resort, the analysis showing the water to be unexcelled for the cure of rheumatism and stomach disorders. I built a large hotel at the east foot of the spring mound, and in order to utilize the hot water for bath-house and hotel use, including heating of the hotel through radiators, I found it necessary to clean out the spring and wall it up to prevent loss through various small leaks through the mound formation. It proved a costly task, but I felt remunerated by the discoveries. The diameter of the spring excavation was 25 feet, and when I reached the depth of 26 feet I found the spring inclosed by a wall of red marlite stone, round and symmetrical as man could build. Thousands of tons of dirt and rock had been thrown into the spring, and after removing this to the depth of 26 feet, I began to find Indian remains and relics of Indian art. The mound, 26 feet in height, formed on top of the red marlite formation, had been made from the deposit of minerals in the water.

At a depth of 28 feet we discovered a distinct burial of a human being covered with mesquite bush, on top of which were boulders. There were three such burials discovered between the 28th or 31st foot levels, and with each one were found war clubs of stone, spear points, arrowheads, one wooden bow, almost complete, beads, mortars, etc.

We secured quite well-preserved parts of several skulls and other parts which would indicate that the people were of average stature. I supervised the whole work, and, with the assistance of my wife, have now nicely preserved and arranged in a cabinet every relic taken from the spring, the principal ones being: (1) Parts of skulls and bones of several human beings; (2) over 50 spearheads and arrow-heads of every shape and style of workmanship, the spearheads being notable for size and symmetry; (3) nine large war clubs, made of stone; (4) a large variety of teeth of animals, as well as large bones of extinct animals; (5) ten stone pipes from 4 to 7 inches in length—the most interesting relics found; (6) a flint hatchet and a stone hammer, together with stones worn flat from use, beads made from vegetable seed and bird bones, part of two Indian bows, with a quiver, in which was quite a bunch of long, coarse black hair that was soon lost after being dried.

In the vicinity of Hudson Springs, within 3 to 8 miles, there are numerous burying grounds and other evidences of dwellings of the earlier Indian tribes, the graves all containing more or less decorated pottery, a few good examples of which I also have.

Within 1 mile of this hot spring are two cold springs, while $1\frac{1}{2}$ miles to the west is another warm spring of medicinal water (temperature 98°) that flows nearly 1,000,000 gallons daily. This spring comes up from the south base of stone fortifications of considerable extent, which stand out on a level mesa in a commanding position.

In the East instances of the discovery of relics of arts in springs are rare. A deposit of flint blades found in a spring in North Carolina is exhibited in the Smithsonian Institution.

The most notable examples of sacrifices of this general class are recorded by explorers of Central and South America, where offerings of gold and precious things of various kinds were cast into lakes,

streams, springs, and the deep cenotes, or natural wells, to appease the gods believed to dwell therein.

Perhaps the most important fact connected with the finds at Afton is that we have here, for the first time, a large assortment of stone implements and other objects identified fully with a particular tribe and period. We have, as it were, recovered a notable chapter directly out of the prehistory of the primitive buffalo-hunting tribes of the Great Plains.

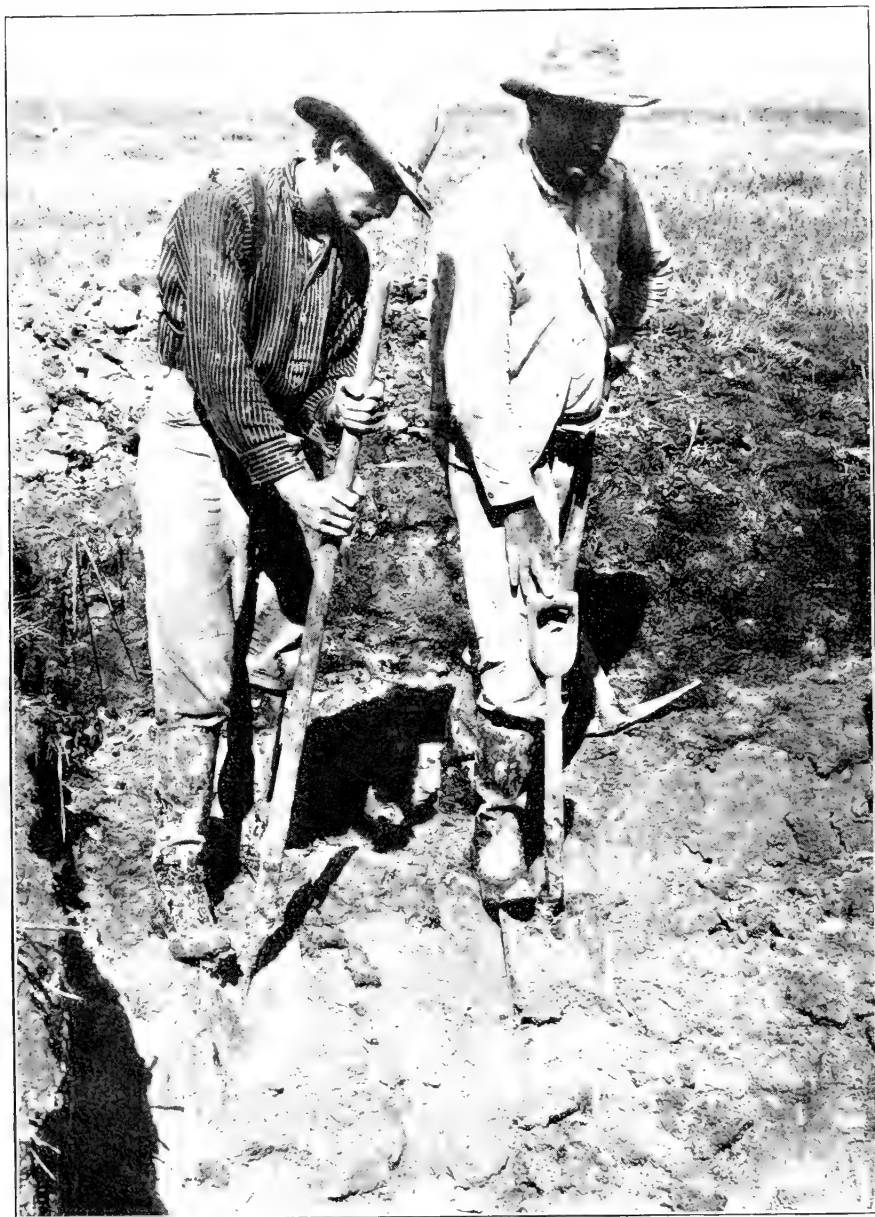
A second advantage of these over other deposits or caches of implements in the great Mississippi Valley region is that the exact motives of the makers of the offerings are made known to us. The story of the old Osage medicine man agrees in every respect with ideas formulated by ethnologists as a result of studies in other regions and among distinct peoples. It is a remarkable fact that the practice of sacrificing to the spirits of springs is almost universal amongst primitive men.

The association of human relics with the remains of extinct animals is always a matter of much scientific interest, but it appears that in this case the association has little significance. The fossil bones belong to the early geological formations of the region, while the human relics are of recent introduction into the spring.

The course of events witnessed by the fleeting ages in the region of the Neosho Valley may be outlined somewhat as follows: About the close of Pliocene times, or in the earlier part of the Pleistocene, the great plains of the interior of the continent were overrun by vast herds of elephants, horses, bison, and other strange creatures, which slaked their thirst at the bubbling springs, if these then existed, or otherwise in the streams and lakes of that time, leaving their carcasses to rot there. Then the Ice Age supervened, and vast changes came over the region and its life. The glacial chill drove the herds to the south or destroyed them, and the glacial floods buried their remains in deposits of sand and gravel. Then there arrived, from no one knows where, the buffalo, the elk, and the deer, with attendant swarms of carnivora and minor beasts. With these, or following them, came the Indian, with spear and bow and arrow, and the era of the chase began. Afton Springs were flowing, as they had been no doubt for ages, and the beds of muck received the bodies of the dying herds as before. But with the coming of man a new element was introduced—the springs, abounding in bones of unknown monsters, became places of veneration and were peopled with spirits of the savage pantheon, and to these sacrifices were made, the most precious possessions of the hunter peoples finding a resting place in the sulphurous shrine. The last, the present episode in Afton's history, witnessed the disappearance of the buffalo and the red hunter and the coming of new cattle and a strange people. Then followed the keeping of herds on the plains about, the building of towns, the construction of railways, and finally the cleaning out of the springs and the discovery of its interesting treasures.



SITE OF AFTON SULPHUR SPRINGS.



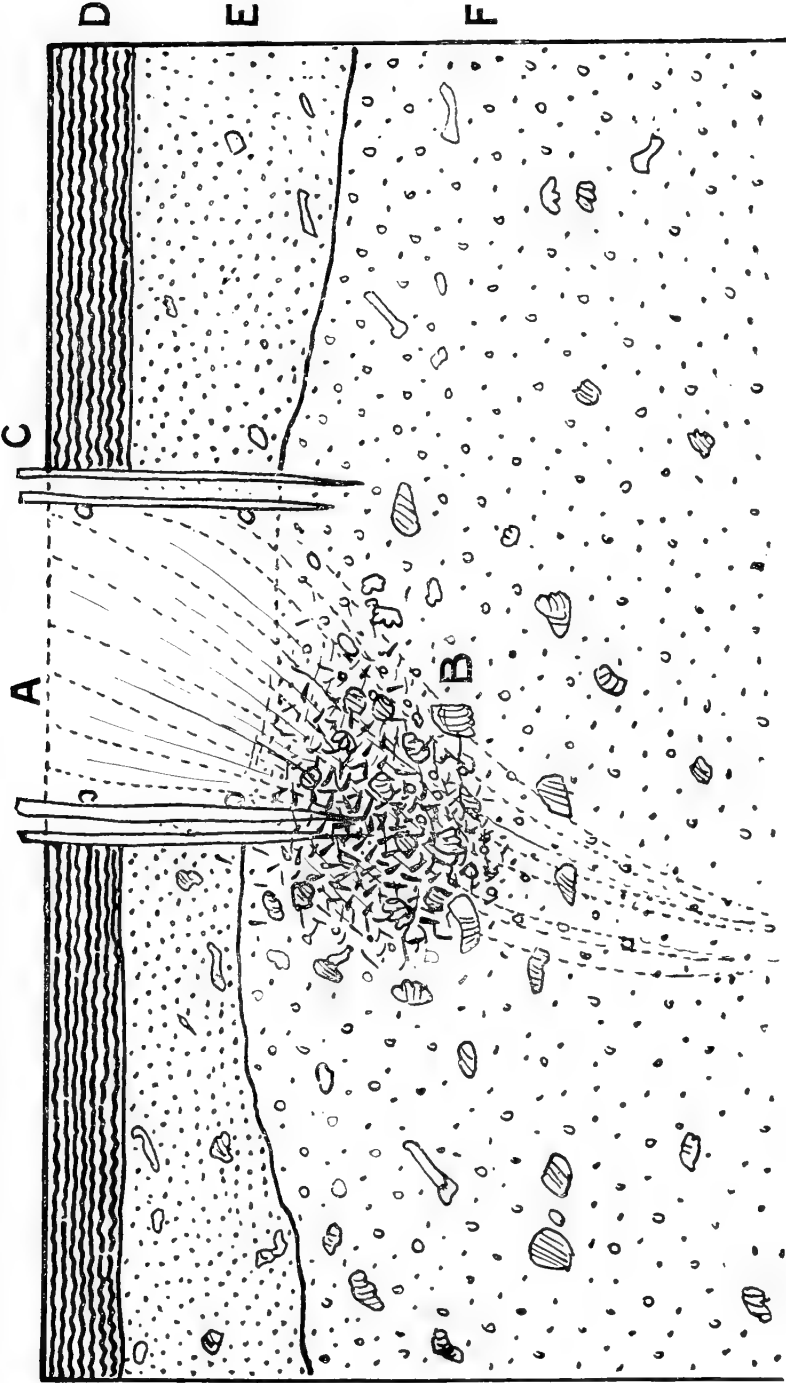
DISCOVERY OF A FLINT IMPLEMENT IN THE SUPERFICIAL SANDS.



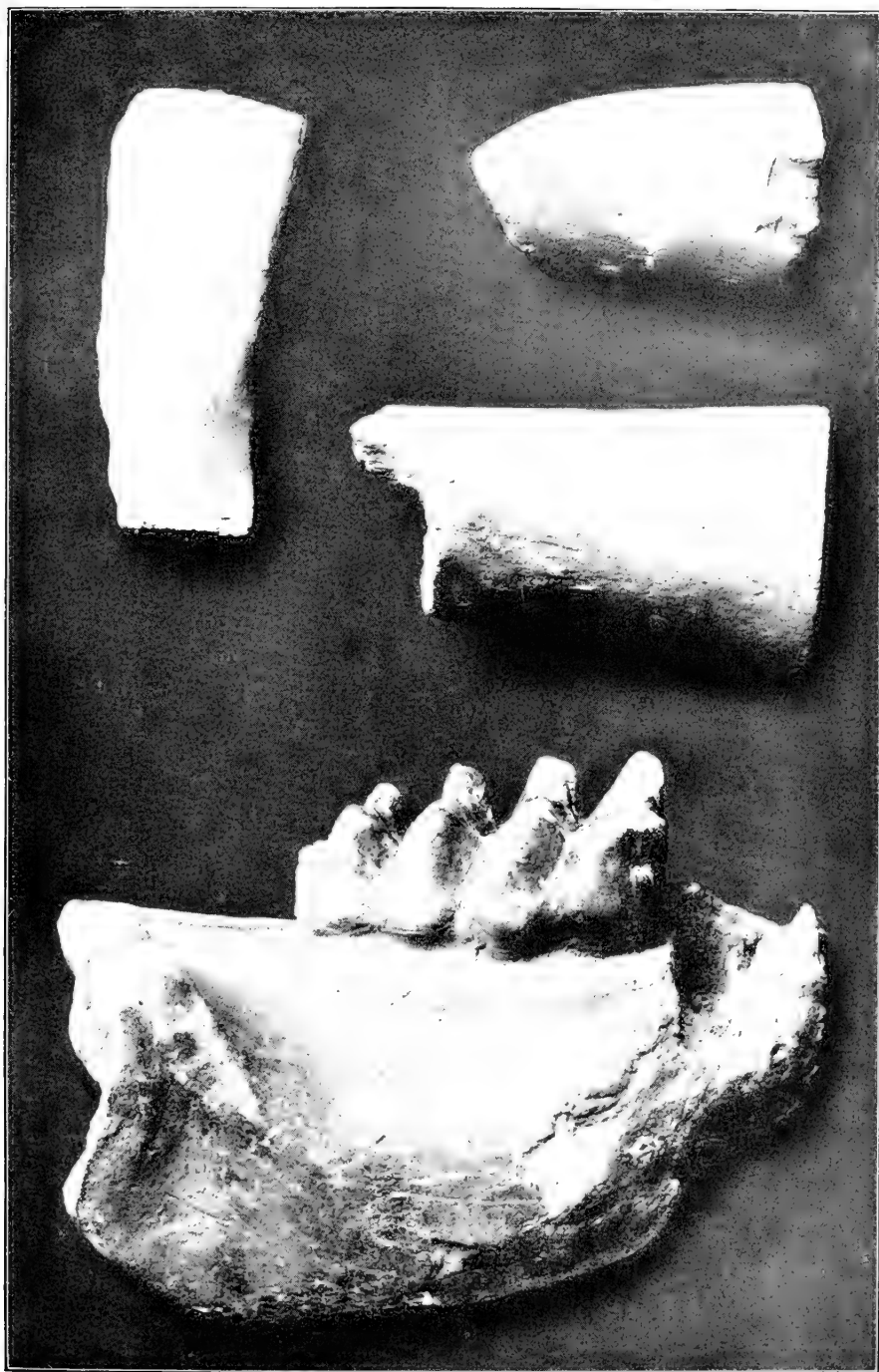
DIFFICULTIES MET WITH IN MAKING EXCAVATIONS.



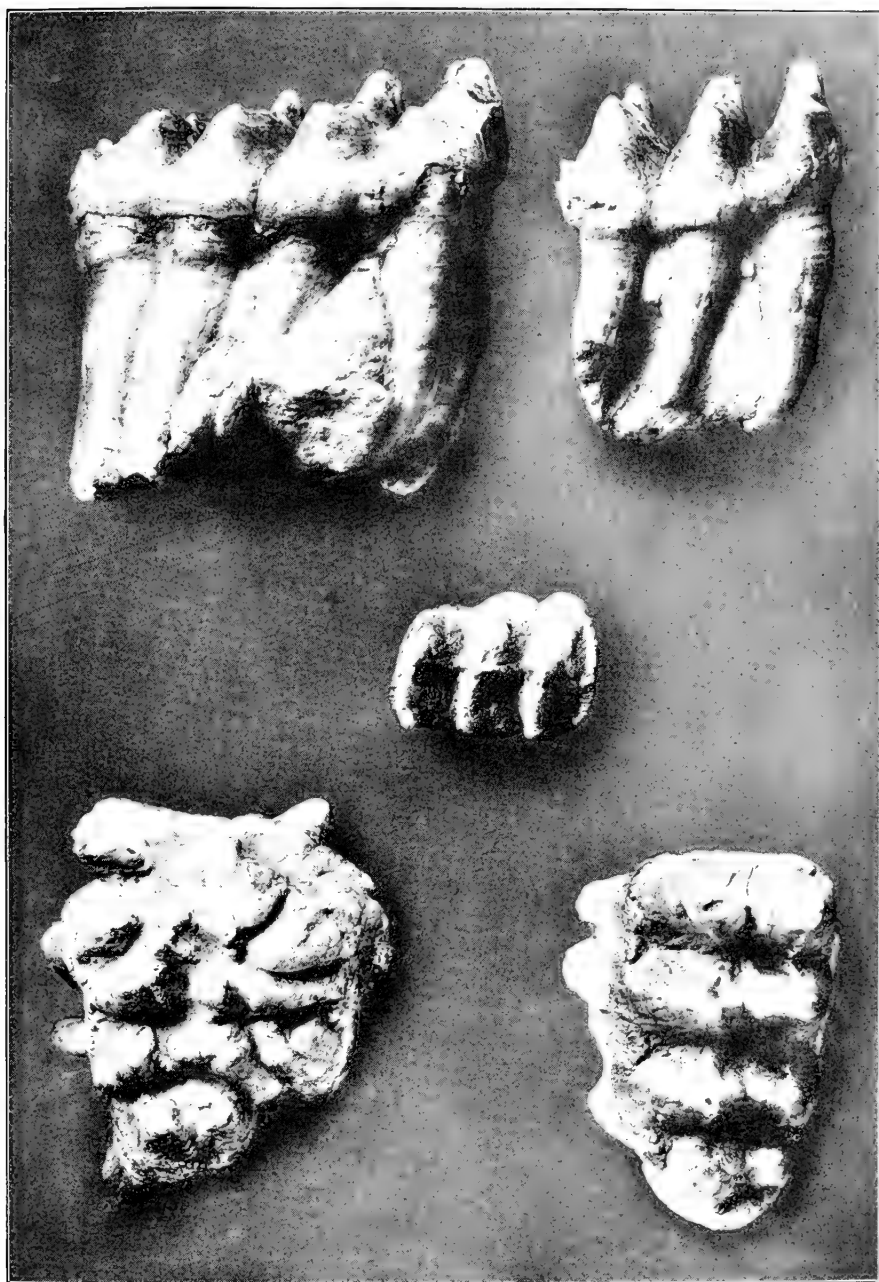
MAMMOTH TEETH FOUND IN THE GRAVELS.



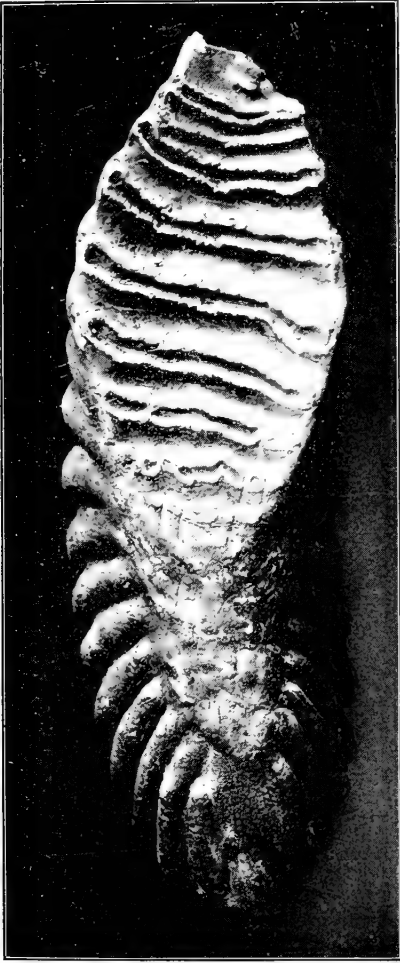
SECTION OF SPRING AND ASSOCIATED GEOLOGICAL FORMATIONS.



FRAGMENTARY CONDITION OF FOSSIL BONES.



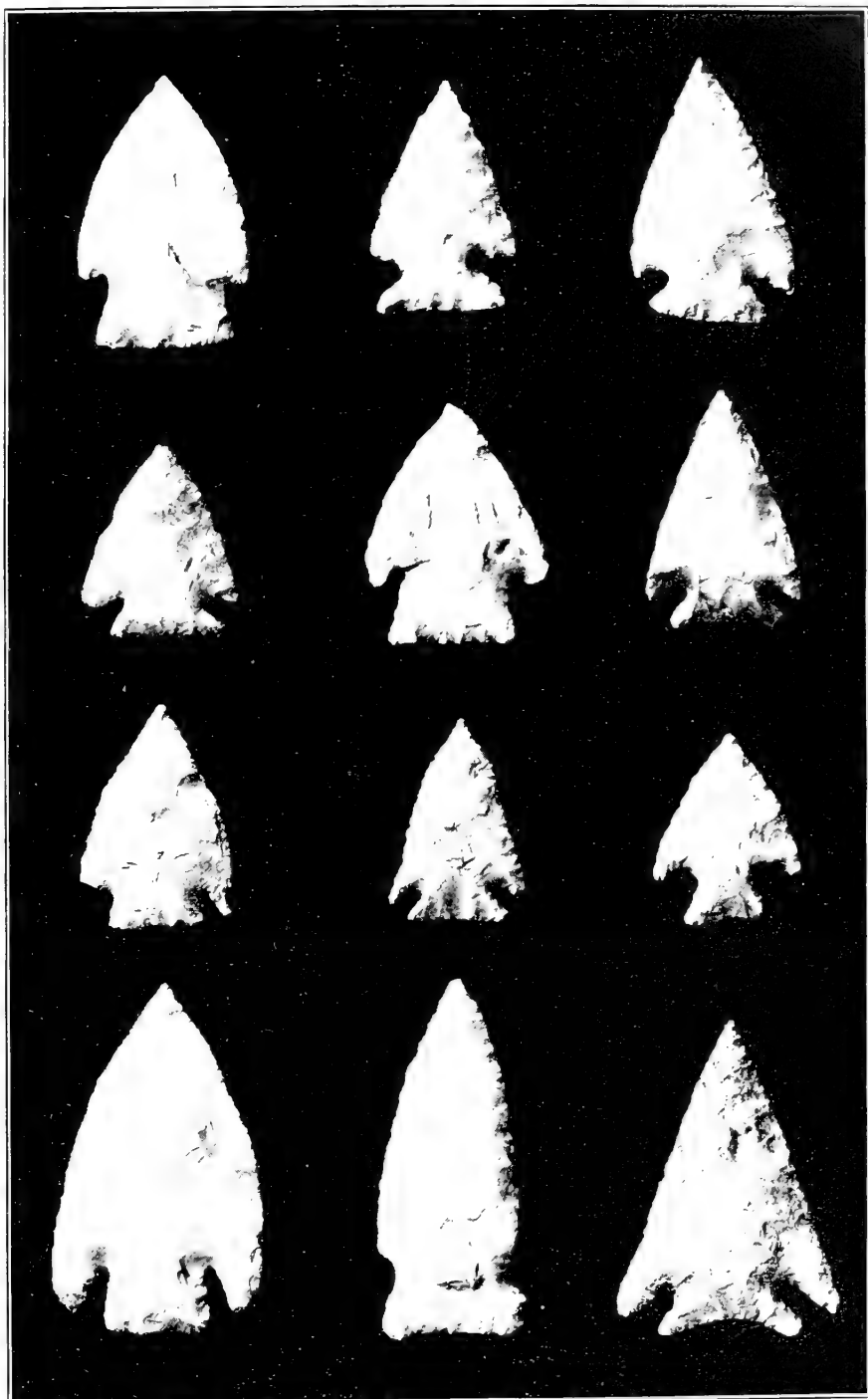
MASTODON TEETH.



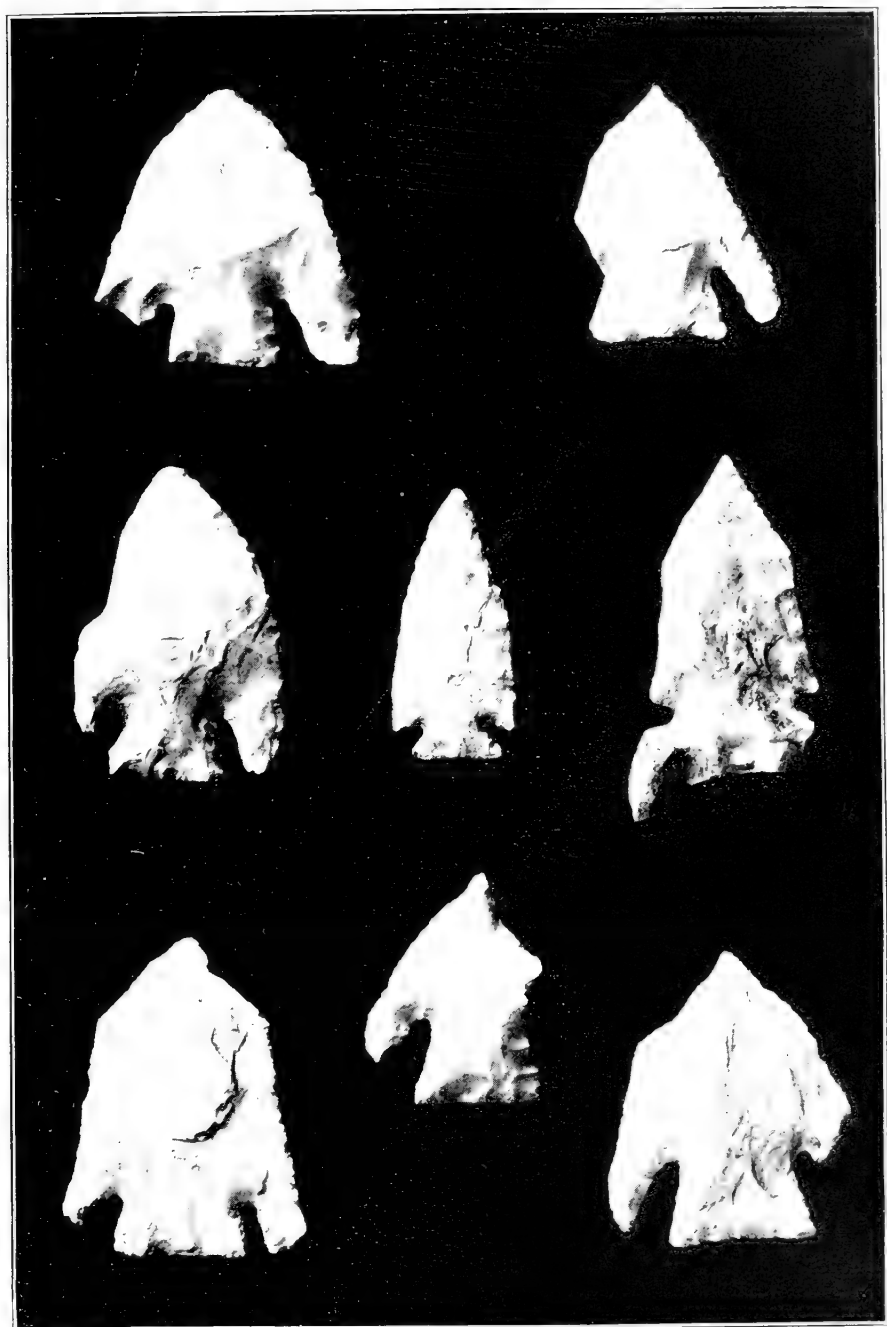
MAMMOTH TEETH.



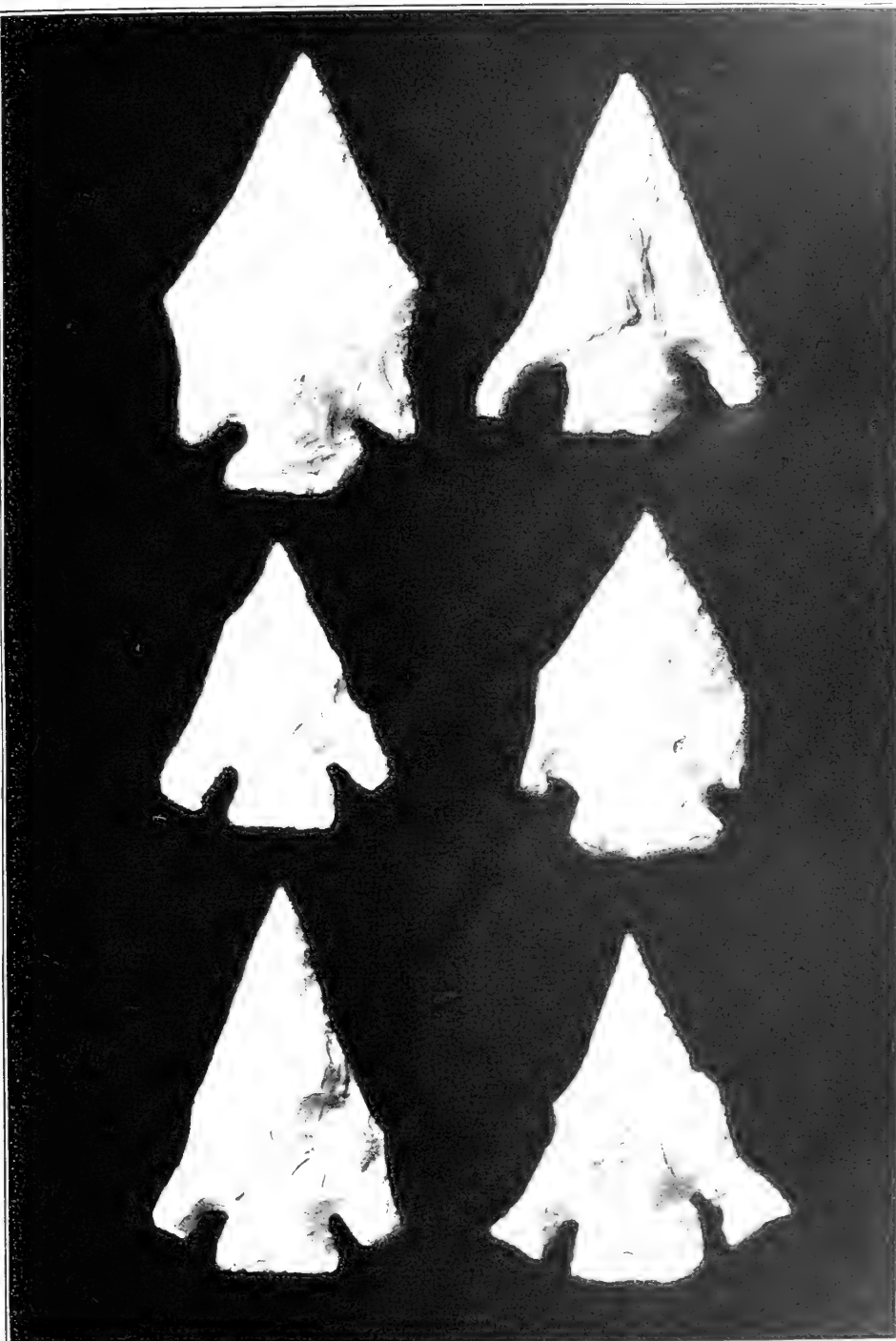
MAMMOTH TEETH.



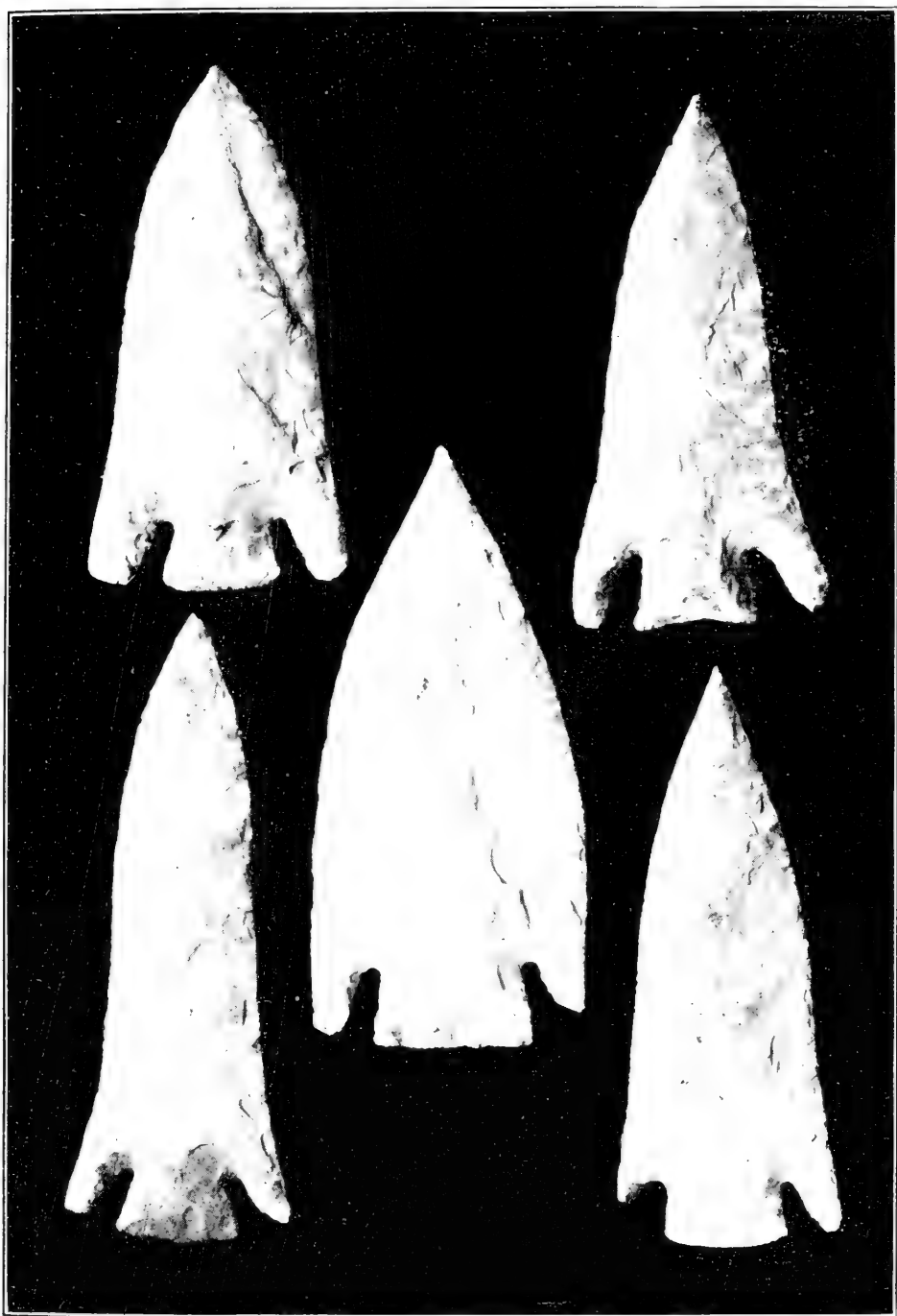
ARROW AND SPEAR HEADS (THREE-FOURTHS ACTUAL SIZE.)



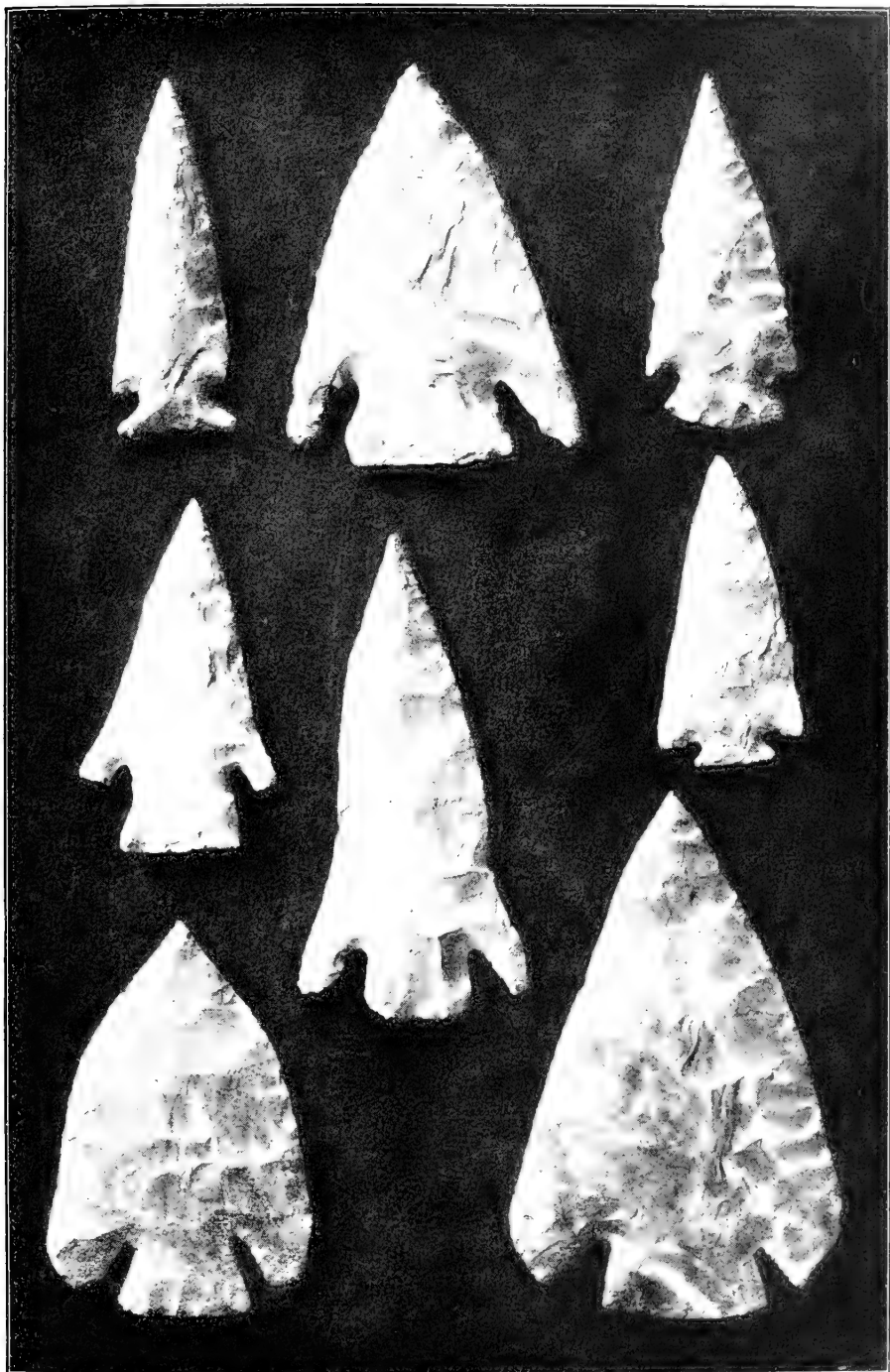
ARROW AND SPEAR HEADS (ABOUT THREE-FOURTHS ACTUAL SIZE).



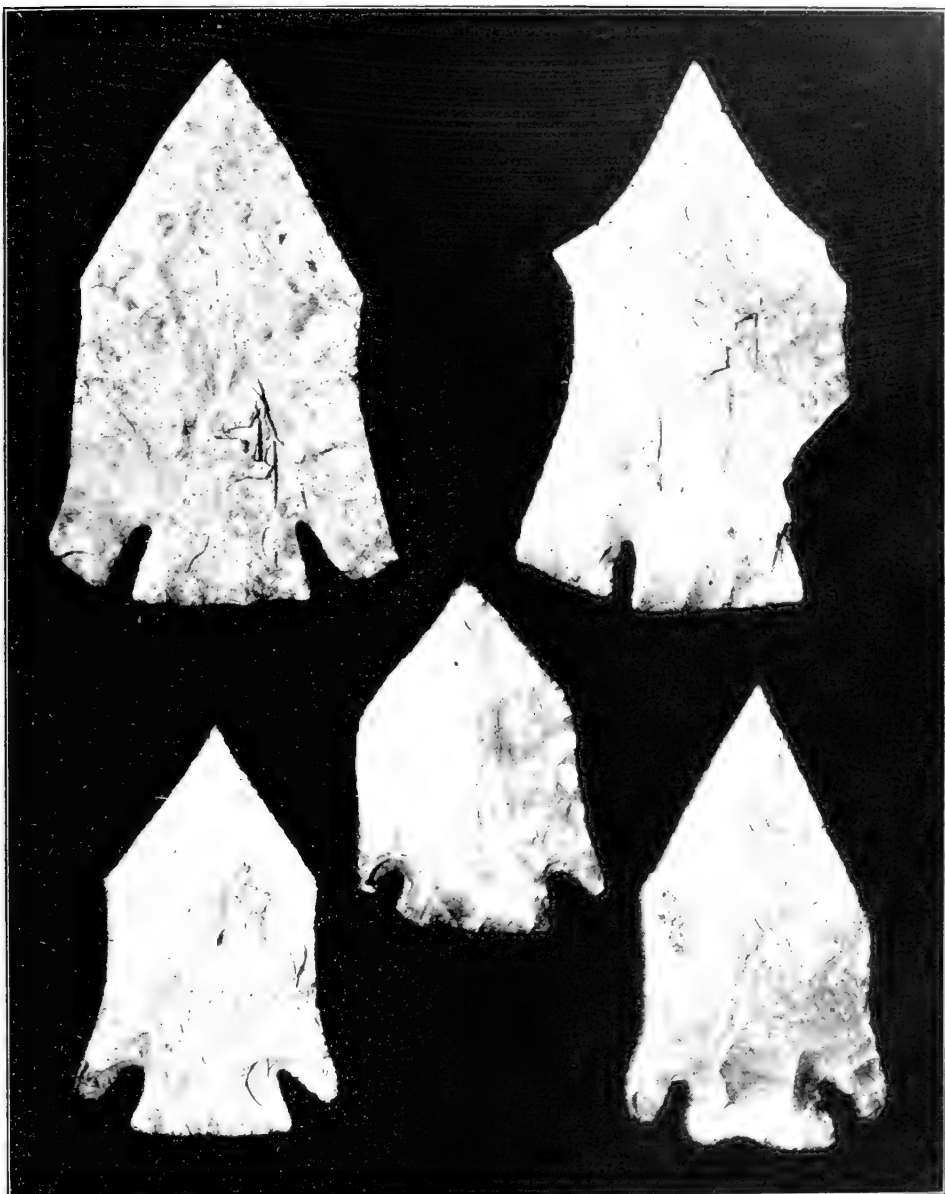
SPEARHEADS (THREE-FOURTHS ACTUAL SIZE).



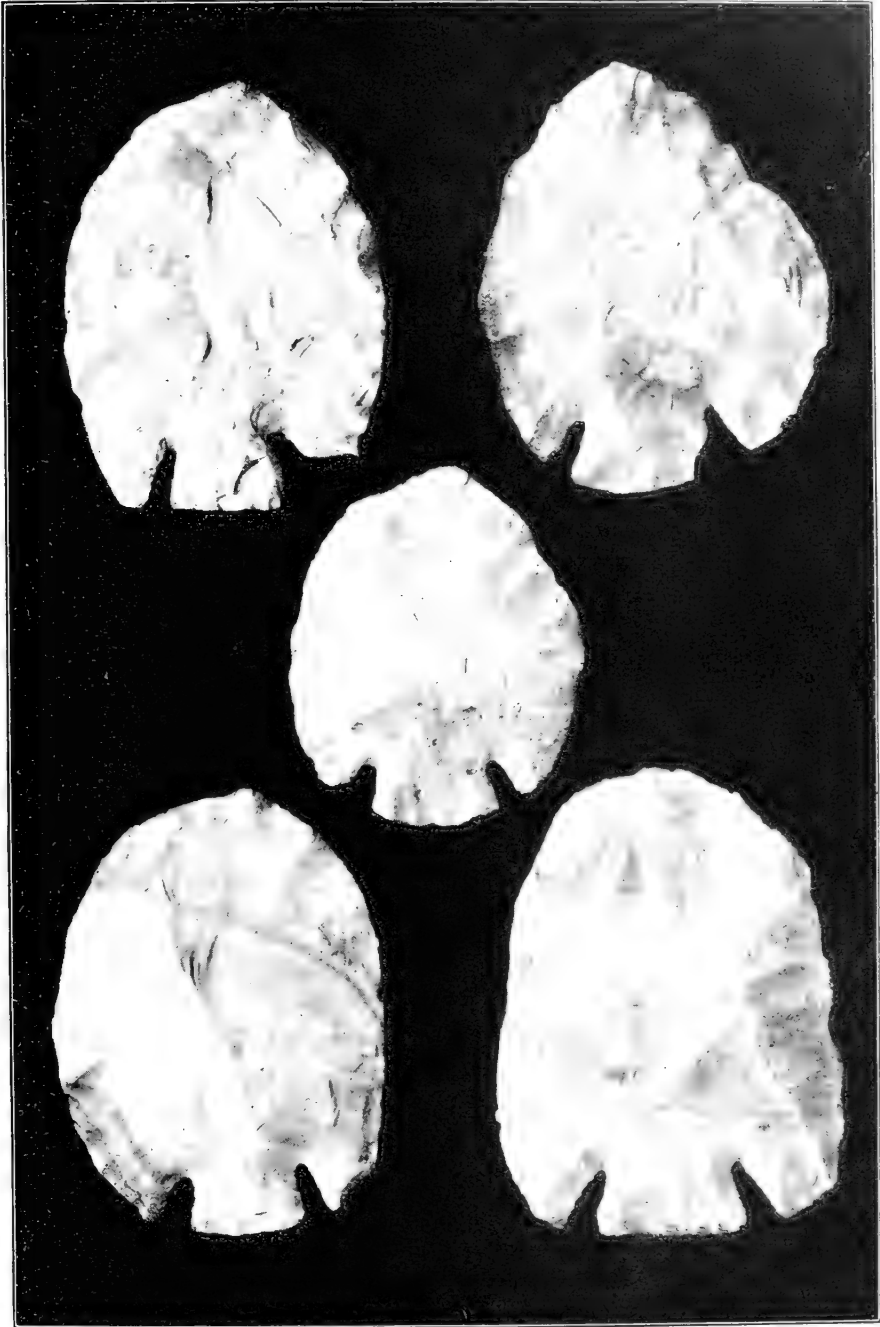
SPEARHEADS (THREE-FOURTHS ACTUAL SIZE).



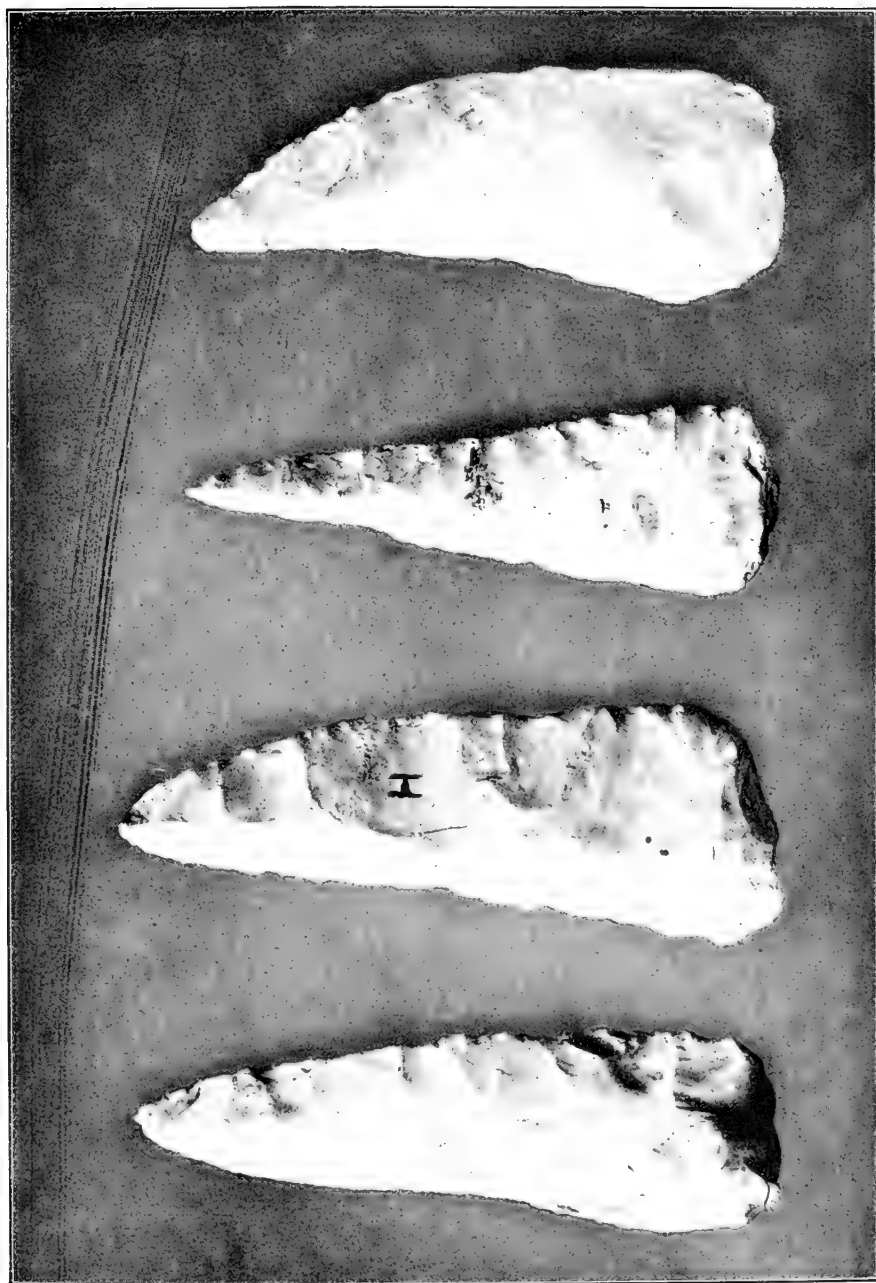
SPEARHEADS (ABOUT THREE-FOURTHS ACTUAL SIZE).



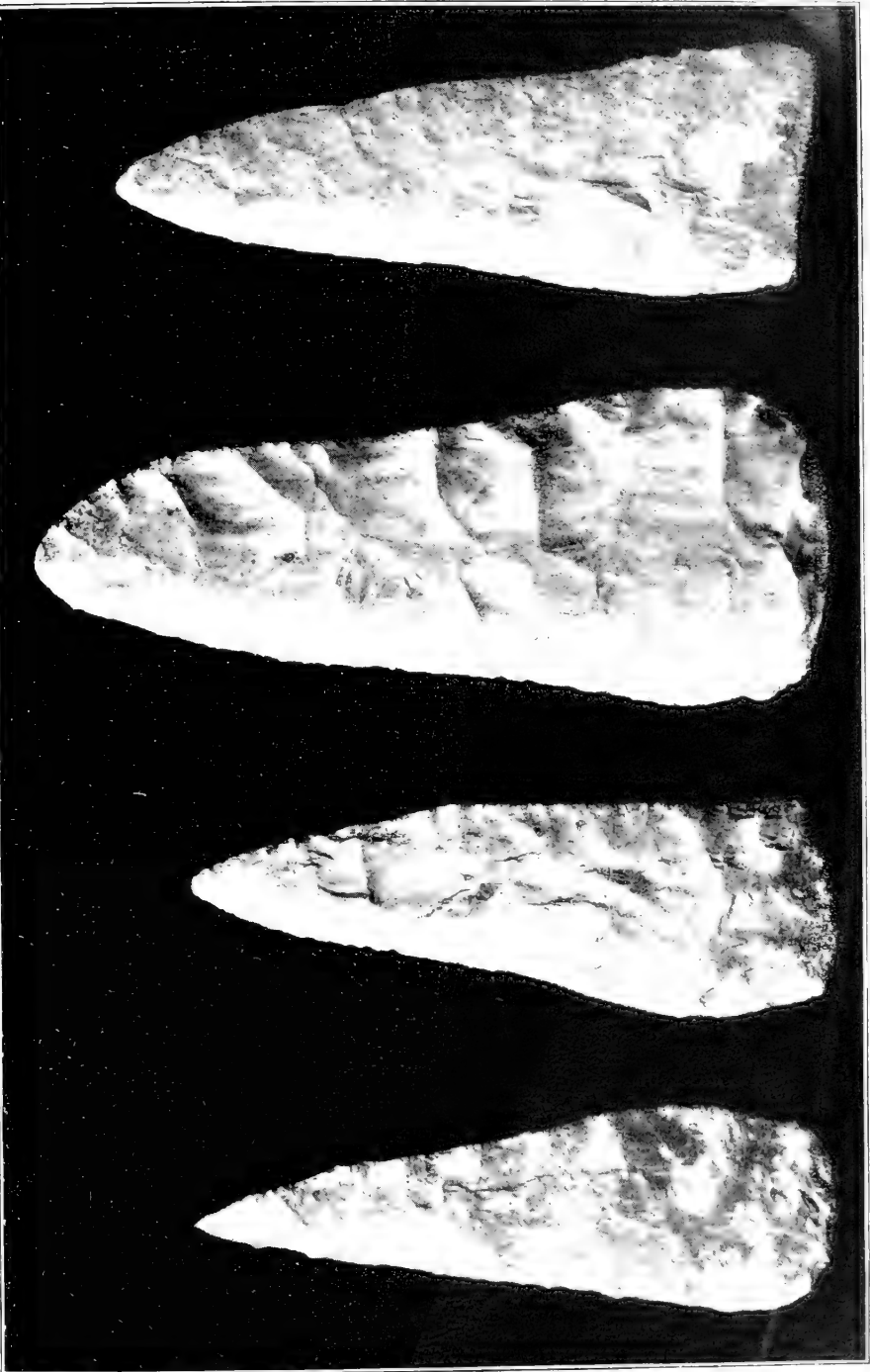
SPEARHEADS (TWO-THIRDS ACTUAL SIZE).



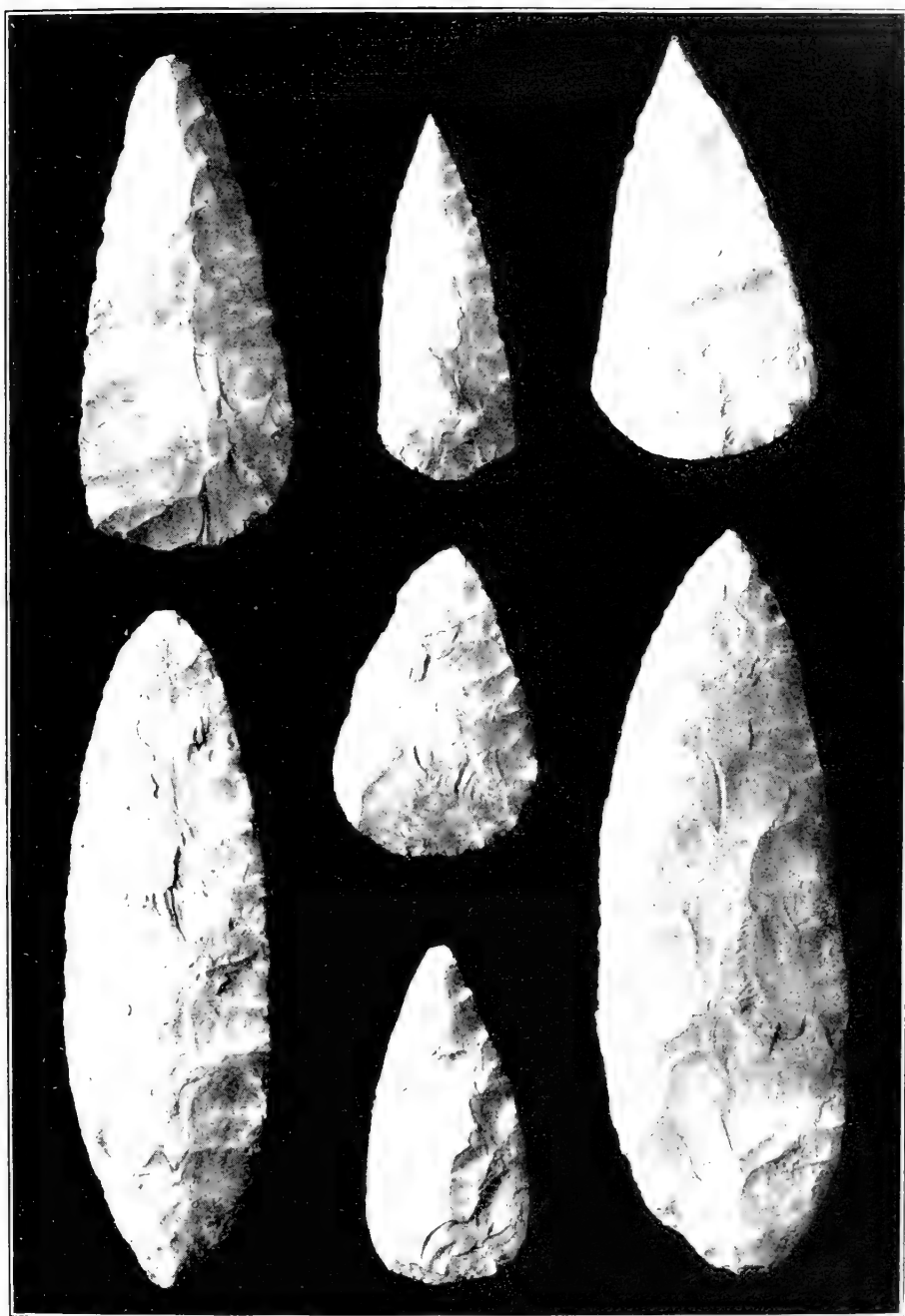
BLUNT-POINTED SPEARHEADS (ABOUT ONE-HALF ACTUAL SIZE).



WELL-WORN KNIVES (THREE-FOURTHS ACTUAL SIZE).



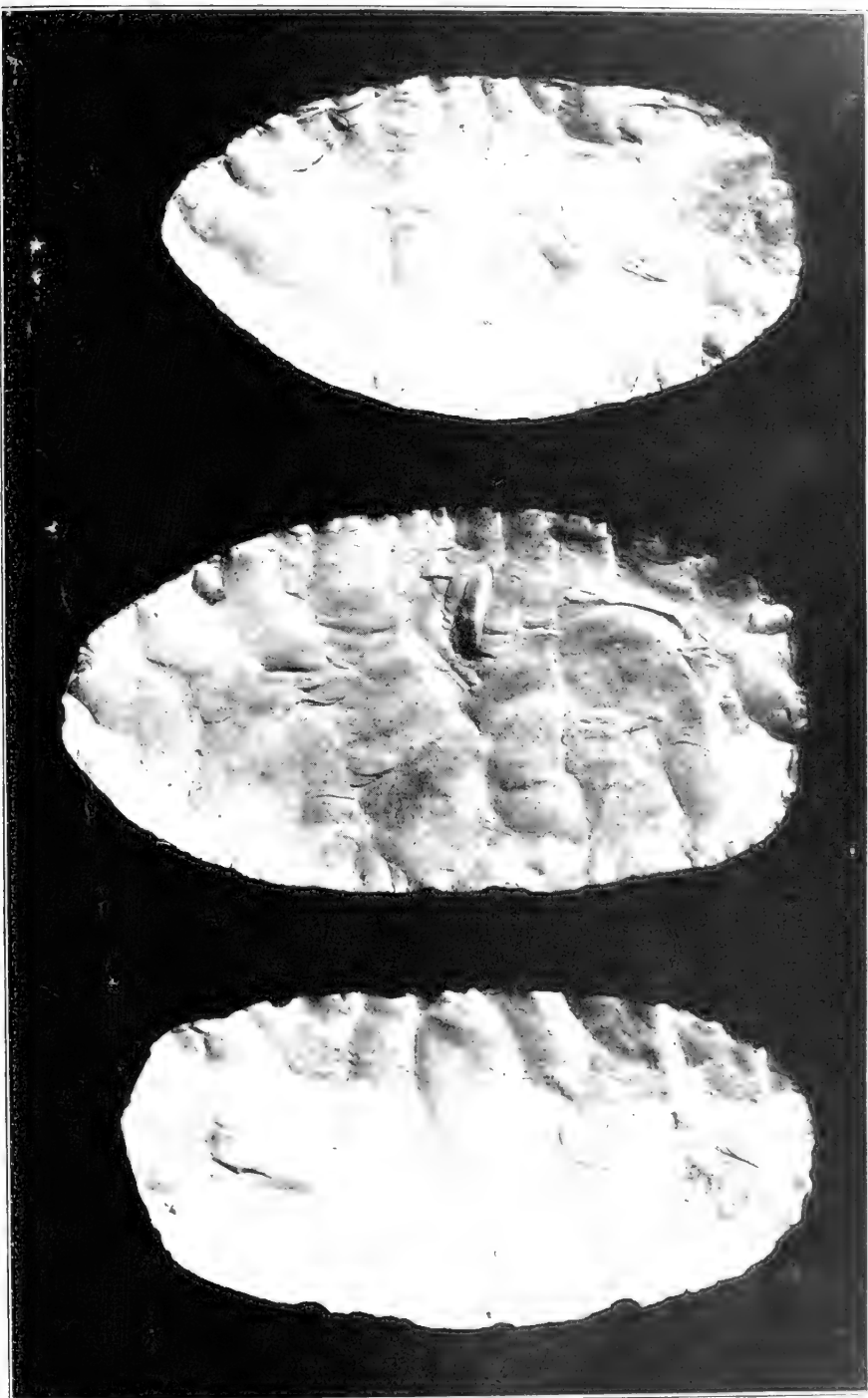
KNIVES (THREE-FOURTHS ACTUAL SIZE)



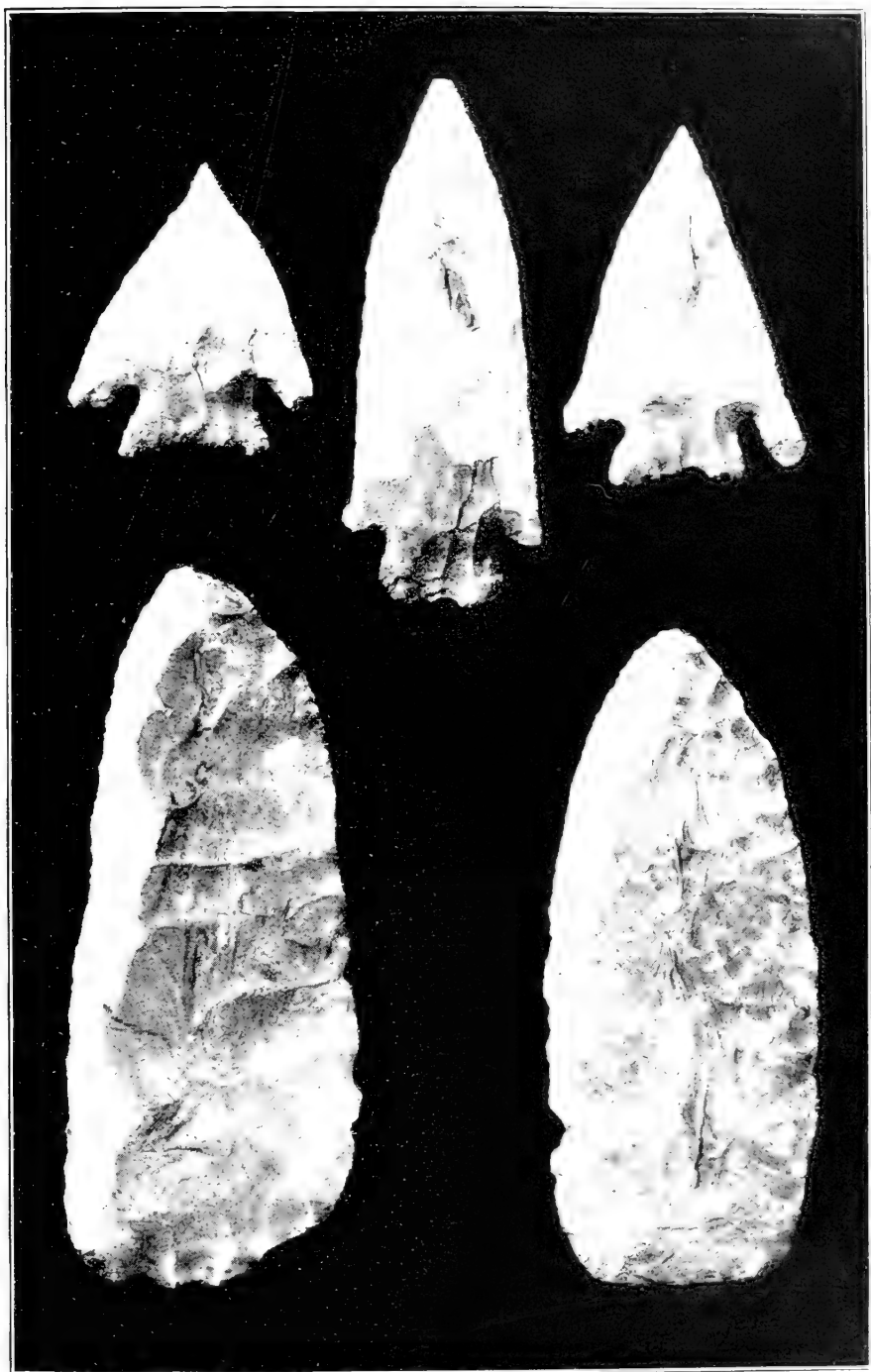
SYMMETRIC BLADES (ABOUT THREE-FOURTHS ACTUAL SIZE).



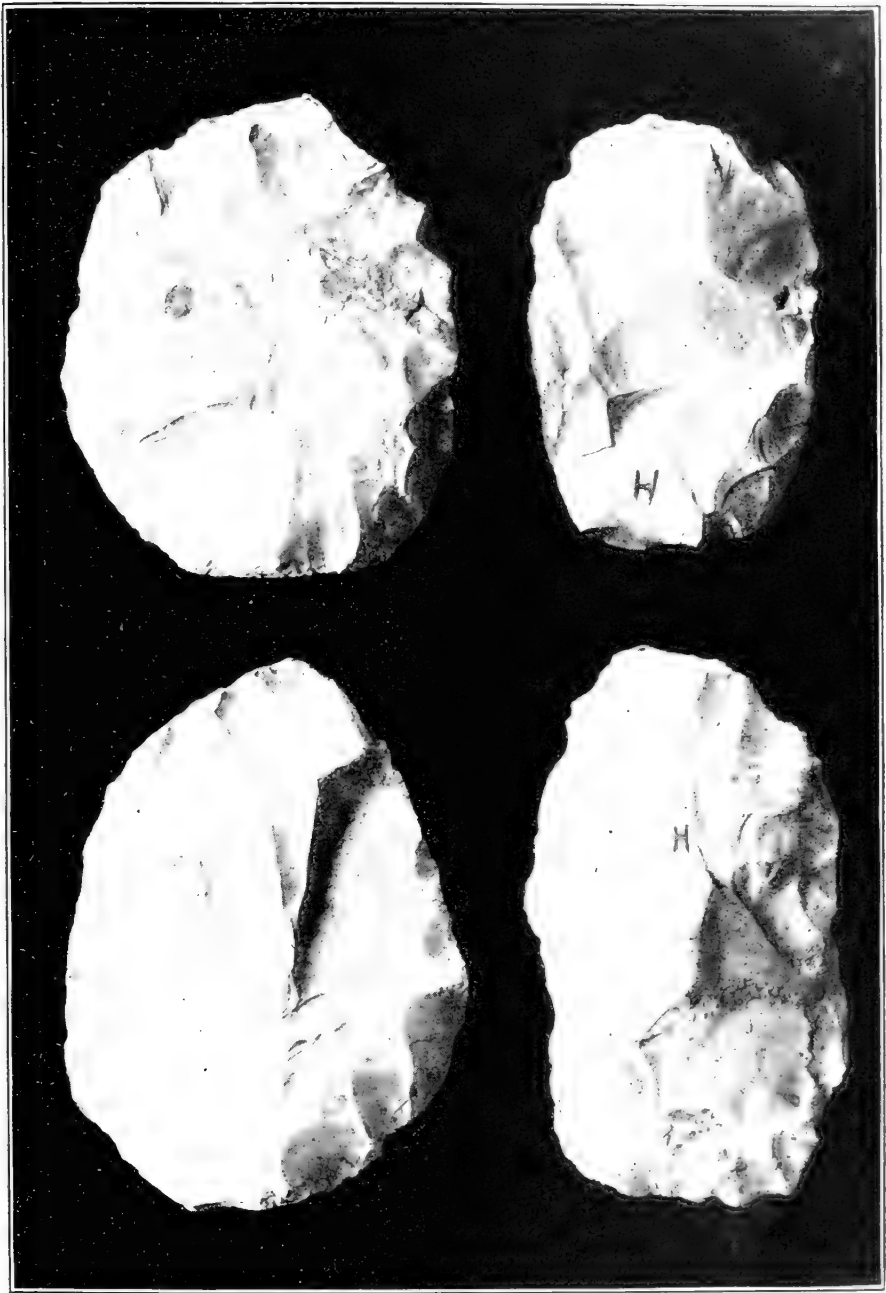
ROUGHED-OUT BLADES (THREE-FOURTHS ACTUAL SIZE).



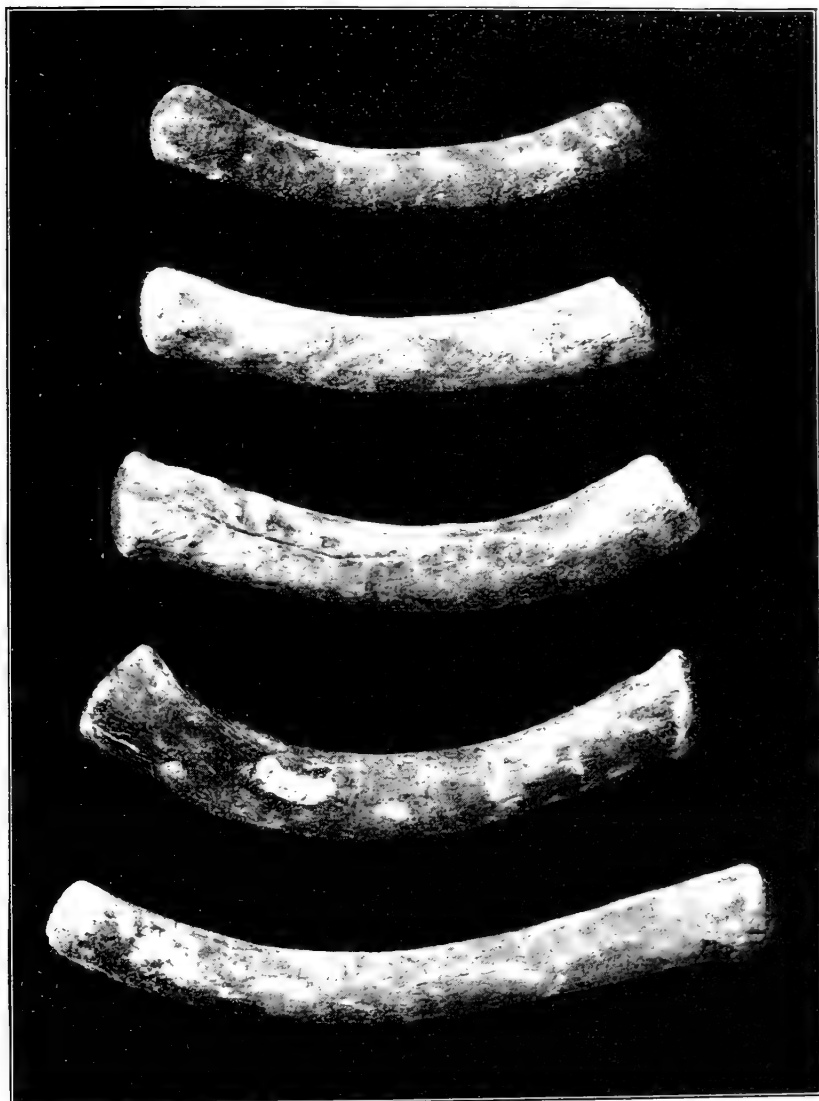
ROUGHED-OUT BLADES (THREE-FOURTHS ACTUAL SIZE).



ROUGHED-OUT BLADES (THREE-FOURTHS ACTUAL SIZE.)



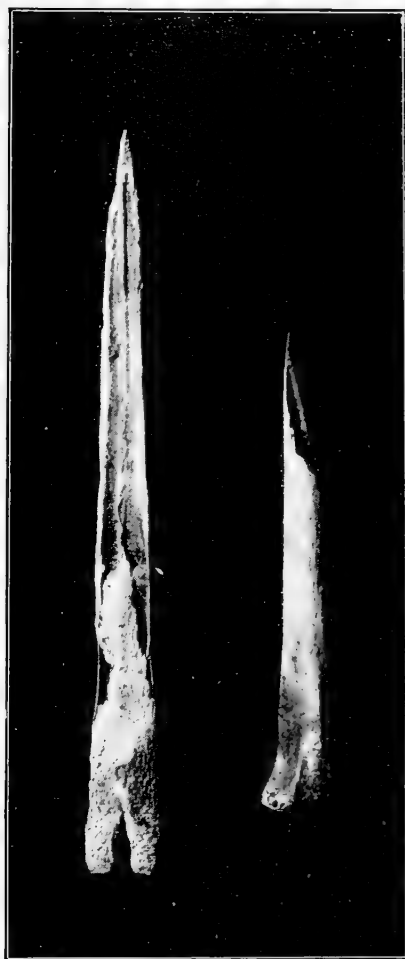
FRESHLY SHARPENED IMPLEMENTS (THREE-FOURTHS ACTUAL SIZE).



ANTLER IMPLEMENTS (ONE-HALF ACTUAL SIZE).



ANTLER IMPLEMENTS (ONE-HALF ACTUAL SIZE).



BONE IMPLEMENTS (ONE-HALF ACTUAL SIZE).

CLASSIFICATION AND ARRANGEMENT OF THE EXHIBITS OF
AN ANTHROPOLOGICAL MUSEUM.

BY

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SCOPE OF THE ANTHROPOLOGICAL FIELD.

The history of man, including all that he is and does and all that he has been and has done, is a wide and important subject, and is fortunately susceptible, in large part, of lucid and effective treatment in the museum. The available materials are of two principal classes. The first relates to man himself as a biological unit, and the second to the works of his hands, the creations of his developing mind. These two divisions of the subject are readily separated and require independent treatment in the museum. The first division is known as *physical anthropology*, often called somatology; the second may in contradistinction be called *culture anthropology*, since it embodies the vast range of the essentially human activities.

SOMATOLOGICAL DIVISION.

If we discuss man independently of his arts—his artificial activities—we treat him from the standpoint of the naturalist or biologist. Physical anthropology includes the study of man as a species of animal, of his races and varieties, his external characters, his anatomy, physiology, and pathology. It includes his ontogeny—the development of the individual—his inception and embryonic evolution, his advance to maturity, his descent to the grave and return to the elements whence he arose. It includes his phylogeny—the development of the species from lower forms of life—the evolution of every part of his frame, the skin, bones, muscles, circulatory system, nervous system, and other special organs, and the relation of these parts, one and all, to corresponding parts of the lower animals. This is a magnificent field for illustration, and, in capable hands, may readily fill a museum with

^aThe scheme elaborated in this paper is now being carried out in the United States National Museum as rapidly as conditions will permit.

exhibits of superlative interest and value. It is true that man is properly treated along with the lower orders of creatures as one of a great system of biological units, and he should therefore be included in all general biological presentations in museums. But man constitutes a unit of particular interest and importance which should be presented as a whole. The first chapter in any treatise on anthropology deals with man's physical characteristics and his relations to nature. The curator teaches but half the lesson if he omits illustrations of the physical man from his museum exhibits. The naturalist could as consistently display the nests of birds in a separate department from the birds themselves as could the anthropologist present the phenomena of culture independently of the physical man. There is excellent reason, therefore, for making a special study and exhibition of physical man in immediate association with culture exhibits. It is necessary to bring together everything that relates to the great human group. However, it is not the purpose at present to take up this branch in detail, but rather to give almost exclusive attention to the phenomena of culture.

CULTURAL DIVISION.

If the physical phenomena of man include all that connects him with the brute, his culture phenomena include all that distinguishes him from the brute. If we wish to realize more fully the scope of the latter division of the subject, which includes the objective evidences of culture, we have only, in imagination, to sweep away all the multitude of things that it has brought into the world; destroy every city, town, and dwelling, every article of furniture, picture, sculpture, book, textile fabric, fictile product, every article of clothing and ornament; every vehicle, machine, utensil, and implement, and, in fact, every trace of human handiwork; set aside the use of fire and cooked food; banish all language, social organization, government, religion, music, literature, and intellectual life generally. When this has been done we may behold the real man standing in his original nakedness among his fellows of the brute world.

Limitations of culture material.—The material evidences of culture are thus seen to be of vast extent and importance; but it should be observed that, notwithstanding this fact, all of culture can not be illustrated in the museum, for in it we can utilize material things only. We can not show by its collections the social, moral, religious, and intellectual traits of man save in an indirect way. We can do little to illustrate language save by displaying the methods of its expression to the eye in pictures and letters. We can tell little of religion save by assembling the idols and devices that represent its symbolism and the paraphernalia which pertain to the practice of its rites. We can tell nothing of music save by a display of the curious array of instru-

ments used in producing sound, and society and government are even less within the sphere of the museum. Yet it is wonderful how much of the immaterial side of the race can be illustrated by the material things that man has used and made, for the mind is in the things and was developed with and by the things more than is commonly understood.

Classification of culture materials.—But what shall we attempt to show in the culture division of our anthropological museum, and how shall we classify and place our collections? Classification is the first essential. If we look at the world and its inhabitants from a sufficiently distant point of view, a few of the greater groups of facts attract the eye. First, we observe that men are of several distinct races and varieties; but a closer look demonstrates that these are not separated one from another, but are intermingled in such ways as to afford no basis save the most general for a grouping of their culture products. Second, we observe that nearly all peoples are separated into social and political groups—into clans, tribes, and nations—occupying distinct areas of the habitable globe. Looking closer at these, one sees that they are not all alike; that the widest possible differences in condition and culture status exist. Some of the groups are savages almost without art and without any evidences of higher culture; some are more advanced, occupying the barbarian grade, while still others are highly cultured and surrounded by a thousand evidences of enlightenment and luxury. Shall we then classify and display our museum exhibits on the basis of this grouping of the peoples into tribes and nations? Let us see what would be the result. The British Empire is possessed of commanding power and boundless territory, but its culture materials would comprise every variety of product under the sun, from the lowest to the highest, and from every known region of the globe. The same is true of nearly all of the civilized nations. It is evident, therefore, that units of this class are too large and too complex to be of use in classification. Besides, civilized nations may well be expected each to have and maintain its own national museum.

Let us take another illustration. Suppose that we decide to arrange our collections by the inferior social or political units—as by states or tribes. Investigation shows that these units are too small; that we should have thousands of exhibition units—too many entirely for practical purposes of grouping and installation. Besides, some are artificial divisions, and some are natural divisions, and the classification would be mixed and wholly unsatisfactory. What is wanted is a simple, natural grouping of the very diversified ethnic phenomena.

Glancing a third time over the field and noting especially the culture of the various groups of people, we find that it varies with the region rather than with the race or nation, and there is a significant relation between it and environment. What uncivilized men do and have done

in any region depends much on the climate and the natural productions of that region. The arctic provinces have one culture, the tropical another; the arid plains have one group of activities, the humid regions another. The inland district has a race of hunters and develops hunting arts; the maritime people becomes a race of fishers and develops fishers' arts, and so on. Culture is thus so much the outgrowth of the region that its products may be assembled by geographical areas, and these may be large or small as occasion demands. The continents, great islands, and groups of islands are subdivided into minor areas. These are called by anthropologists "specialization areas," because they have given special characters to the culture developed within them. They have nothing to do with political lines, and they disregard modern civilization because it has broken over all natural limits and by means of railroads and ships carries its generalized culture to the ends of the earth. But as these areas are largely those in which specialized cultures have had their inception and early development, it is by these that the student can best study and the curator can best illustrate the phenomena of humanity. Within the space assigned to each of these geographic groups in the museum should be assembled illustrations of everything the area produces, no matter what the race, the nation, the culture stage, or the time represented, excepting always the intrusive generalized elements of civilization which must be treated separately in museums of national history.

Geo-ethnic arrangement.—Now, the museum materials intended to illustrate a given geographic-ethnic territory should be such in character and so arranged that the student or visitor passing through the hall or halls in which they are installed may gather quickly a clear impression of the people and the culture of the area represented. I say first "people," because after all it is the people we are studying, and a display of all the culture phenomena of a region without some definite illustration of the people concerned would be wholly unsatisfactory. The man himself as he appears in his everyday life is the best illustration of his own place in history, for his physical aspect, the expression of his face, the care of his person, his clothes, his occupations, his general appearance and social relations tell the story with much clearness.

So, since we can not display the people themselves, we should begin each of our ethnical exhibits by building a lay-figure group, showing a typical family of the area illustrated—the men, the women, and the children—engaged in ordinary occupations and surrounded by the things they make and use and love. Physical characters should be portrayed with all possible accuracy, and a correct impression of the disposition and social attitude of the members of the group should be given. Around this family group should be arranged in separate cases series of objects illustrating the arts, industries, and history of the people represented.

Following the family group, the next most important culture unit is the dwelling group, which may be modeled in miniature (say one-twelfth or one-twenty-fourth actual size) and illustrates the houses and associated constructions of all kinds, as well as something of the home arts and life of the people. Miniature figures of men, women, and children may be added to the dwelling group to graphically illustrate the practice of culinary arts, manufacture of basketry, weaving, pottery, the use of domestic animals, and other arts.

Illustrations of other activities should follow the dwelling group in the order of their importance or significance, each exhibit (consisting of the actual objects or of models) being of sufficient extent to serve as a synopsis of the work of the area represented in the particular region treated. The method of arranging the various series is discussed in detail farther on. Along with the ordinary ethnological exhibits should go exhibits of the archaeology of the area, showing the prehistoric cultural relics and remains, and carrying the story back to the earliest times. The exhibit of each area should be supplemented by maps, pictures, and labels, thus completing an attractive synopsis of its culture phenomena. If a particular area should happen to contain two or more distinct peoples or cultures, exhibits could be added according to space and needs, rounding out the presentation. If several tribes are included and require separate attention, the less typical may be represented by simple costumed figures instead of by family groups.

It would prove instructive to add to each of these ethnic exhibits illustrations of the physical characteristics of the peoples of the area. These may comprise casts of the face or even of the entire figure; the skeleton or parts of it, and especially the skull, which presents wide and significant variations; examples of artificial deformation and mutilation, and collections of such remains of fossil man as are found in the area. This exhibit may also include pictures, diagrams, and maps, completing a synopsis of the somatic characters.

The geo-ethnic units thus described should be assembled in the museum somewhat as is represented in fig. 1. Here a portion of the ground plan of the exhibition hall is presented. An ordinary, somewhat limited ethnic unit occupies space I of this diagram. The lay figure group stands at *A* and the associated exhibits extend across the hall, filling a single row of cases and the wall cases of the alcoves. A larger unit is provided for in II, where besides the single family group *A* additional lay figures are introduced (*a*, *b*, *c*, *d*) to represent less conspicuous peoples. In section III two minor groups are placed, one on the right and the other on the left of the main aisle, with the family lay-figure groups in front (*B*, *B*). In many cases the lack of well-rounded collections will necessarily prevent the building of family groups, and if costumes are at hand single figures may take their place.

Since these proposed exhibition units are to represent terrestrial areas, it follows that their order in the museum should approximate as nearly as may be the geographical order. If, for example, we are dealing with North America, the most northern group or unit should come first and the groups to the south follow according to degree of intimacy in geographical relations. In this way neighboring environments, cultures, and peoples come together and their interrelations may be presented and studied to advantage.

Assuming that the museum space to be occupied is an ordinary hall or series of halls having a convenient width of, say, 120 to 150 feet, the several members of each series would be assembled somewhat as is shown in the diagram. The lay-figure cases (*A, A*) would be ranged down the center of the space, with wide aisles at right and left, the associated exhibits (*a, b, c, d, e*) coming at the sides in whatever order seems most advantageous, each series extending entirely across the hall, as shown in I and II; or, otherwise, standing at the sides, in the manner indicated in III and IV, where *B* and *B* are the family groups, facing the main aisle. The order and relative position of the separate exhibits in each exhibition unit should be approximately uniform. The ordinary visitor would thus be able to pass down the central aisles, observing the various peoples as represented by the lay figures, giving slight attention perhaps to the associated exhibits, while the student of a particular branch—as, for example, weapons of war and the chase—could pass from section to section, examining and comparing in geographic order the successive exhibits illustrative of this branch. The thing most to be desired in conducting the visitor through such a great series of exhibits is to bring the various features before him in logical order, and the suggested arrangement is apparently the best that can be devised.

It frequently happens that a particular ethnic area contains a cultural feature of exceptional importance which is represented by such a large body of material that to display it in the systematic series would be to throw the whole representation out of symmetry. This exigency would be happily provided for by arranging the plan and section of the museum building in the manner indicated in figs. 2 and 3. While the systematic geographic series are provided for in the main skylighted hall (*A*) and its lateral gallery spaces (*B*), say, 140 feet in total width, lateral tiers of inferior side-lighted halls (*C*), properly connected by doorways with the main hall, may accommodate the overflow of unusually developed features. This idea would apply most satisfactorily, for example, in the California area, where a great series of basketry products, so prominent a feature of the ethnology of that region, could be installed in one of the lateral halls (*C*), the systematic exhibit of the area occupying the full width of *A*. Or, again, in the case of the Mississippi Valley area, the great body of archaeological material could

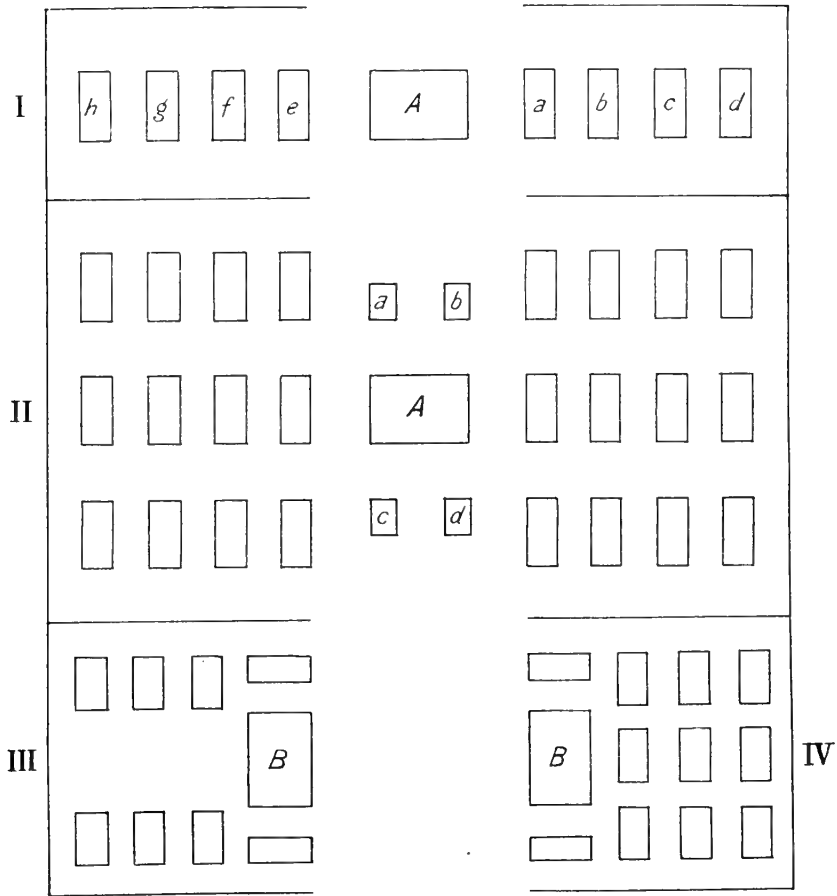


FIG. 1.—Assemblage of geo-ethnic units of different sizes. I. A small unit extending the full width of the hall and occupying a single line of cases. II. A large unit, also extending across the hall and occupying three tiers of cases. III. A small unit confined to one side of the hall, with two rows of cases. IV. A unit similar to the preceding, with three tiers of cases. The wall cases are also utilized in each instance.

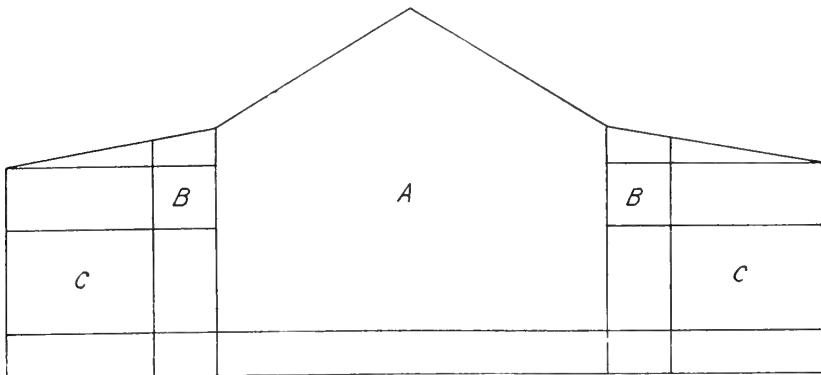


FIG. 2.—Section of museum building showing central sky-lighted hall, *A*, with galleries, *B*, and side-lighted halls, *C*. This grouping of halls seems well adapted to the great body of anthropologic exhibits.

be placed in one or more of the side halls in suitable relationship with the central exhibits, which would consist of the systematic ethnic collections of that area.

The floor plan of the installation proposed above appears in fig. 3. The arrangement of halls suggested is probably as good as can be derived for general culture-anthropology exhibits.

It may be asked whether some other arrangement of geo-ethnic or of other simple ethnic units may not afford superior facilities for examin-

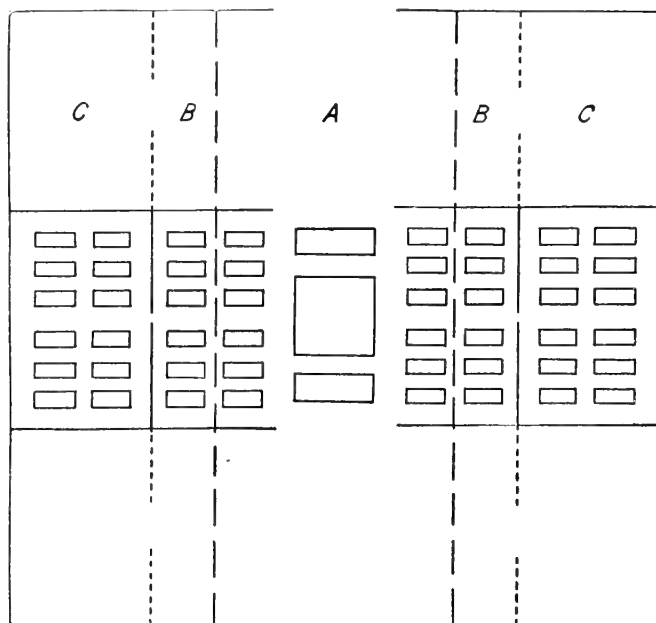


FIG. 3.—Floor plan of a large geo-ethnic exhibit showing overflow into lateral halls C, C'. One full-sized family group and two auxiliary lay-figure groups are provided for besides a large number of auxiliary exhibits.

ing the whole field of anthropological phenomena. If, for example, exhibits illustrating the various groups of peoples in the world should be assembled according to grade of culture rather than with respect to geographical order, the lowest group taking first place and the others following according to culture status, would not the survey of the field be easily and advantageously made? Would one not be able through this arrangement, employing the lay figure groups and the attendant exhibits, before described, to study not only the peoples and compare their culture to good advantage, but to have in orderly view the full range of culture achievement from lowest to highest the world over? This especial concept is illustrated in fig. 4, in which, instead of the linear arrangement, a radiate grouping is suggested. The inner concentric space A could be occupied by the most primitive peoples, the succeeding concentric space B by the next higher peoples, and so on out to the periphery, while the various activities would occupy the radial

spaces 1, 2, 3, 4. These latter would be few in number toward the center, where peoples are simple and arts are few (*a*, *b*), and numerous farther out, where peoples are advanced and activities are numerous (1, 2, 3, 4). To study a particular people, the visitor would follow the concentric lines (*a*, *b*; 1, 2, 3, 4), examining each of the activities of that people in turn. To study a particular grade of culture the world over, he would follow the same plan. To study a particular branch of culture in all its phases, he would pass from center to circumference, noting what each people had done in that branch (*A*, *B*, *C*, *D*). In doing this he would ascend the culture ladder from the lowest to the highest round, traversing the full range of human accomplishment in the various activities. At the same time, if the exhibits were numerous and properly arranged, he could form a fair idea of what the race

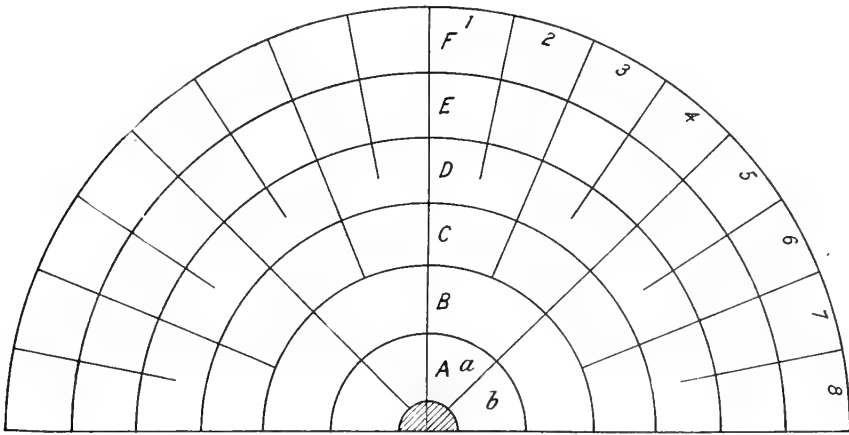


FIG. 4.—Concentric arrangement of entire ethnological exhibit.

as a whole had accomplished, following the development of culture from beginning to end.

This seems at first glance a most complete and comprehensive scheme, for fully worked out it would present the peoples of the world, their activities and history, in a single view. But on closer inspection it is found to have numerous shortcomings, apparently unfitting it for general museum use. (1) In applying it the important factor of the relations of peoples to one another in the world and to their environment must be disregarded; (2) the question of the order of the ethnic units would be difficult to settle, since many peoples are of one grade or nearly the same grade, while some occupy various grades in part; that is, a tribe or nation may be advanced in one direction or activity, calling for an outer place on that account, and backward in another, calling for an inner place; (3) such a grouping would be unsatisfactory save where collections were comprehensive and full; (4) a building of unusual design and dimensions would be required; (5) a most serious objection is that this concentric arrangement of a comprehen-

sive exhibit, consisting of thousands of units, would be highly perplexing to any but the trained museum student and wholly beyond the grasp of the ordinary visitor. Ninety out of every hundred persons would utterly fail to comprehend the arrangement. On the other hand, the straight-away succession of geo-ethnic units seriated according to geographic position (fig. 1), though necessarily falling short in some minor respects, presents the great advantage of simplicity and directness. Units of all sizes are accommodated with equal facility. If a group is small a limited space can be assigned; if a group is large, a larger space or even an entire hall can be devoted to it. Comparative studies in the various culture branches are carried on with reasonable ease, since a particular subject or class of exhibits has, so far as may be, the same relative place in each of the groups. Each culture feature can be studied to best advantage in actual contact with the other features of its own group; that is to say, the pottery of a particular group can be studied better in its own setting of related arts—basketry, sculpture, wood carving, etc.—than it can if separated from them.

The geo-ethnic assemblage of exhibits is generally applicable and affords many advantages, giving at once to ordinary visitors and to students a comprehensive notion of the peoples of the world and their culture in their true proportions and relations. It might well be the fundamental arrangement in every general anthropological museum.

Culture-history arrangement.—But this is not all that the museum can do to illustrate the history of man. Perhaps the greatest fact of humanity is its evolution. By the geo-ethnic arrangement just described we may amply present the peoples of the world, ancient and modern, and yet fail to convey any definite notion of the development of culture, of the progress of arts and industries, and the gradual unfolding of the human mind. These lessons of evolution may be conveyed by assembling artifacts representing the various activities and seriating them according to the stage of culture which they happen to represent. These series may be called culture-history or culture-development series, and, although they are not true genetic series, since the forms can not be said to have arisen one out of another, they may in a general way stand for the genetic order, suggesting forcibly the manner in which one step necessarily gave rise to another from the lowest to the highest throughout all culture history.

These culture-history series may be numerous and extremely varied in character. They may be mere synopses, giving only the great or epoch-making steps of progress, or they may embody many objects brought together from every part of the world. The curator may select only those branches susceptible of ready and effective illustration, the steps of progress being represented by the tools, utensils, and devices employed in the practice of the art or by the products where such exist.

A number of the more important series are included in the list which follows, where they are classified under a dozen or more heads. In many cases only the more important series of a particular group are given. A majority of these series are now included in the exhibits of the National Museum.

In the first group are placed all those activities whose function is that of acquiring or producing the raw materials of subsistence or of culture.

1. Plant gathering, agriculture, horticulture, forestry, etc. Illustrated by the implements and utensils used in (*a*) collecting uncultivated products, (*b*) cultivating the soil, (*c*) harvesting the crops.
2. Hunting, fishing, and zooculture. Illustrated by (*a*) weapons, (*b*) traps and snares, (*c*) hooks and tackle, (*d*) appliances of domestication and culture.
3. Mineral collecting, quarrying, and mining. Illustrated by mining implements and machinery.

In the second group are included the activities that prepare the raw materials for use, a few of which are as follows:

1. The building arts. Illustrated by (*a*) models of the house, (*b*) models of furniture, (*c*) models of water craft, (*d*) models of machinery, (*e*) devices used in construction.
2. The textile arts. Illustrated by (*a*) basketry-making appliances and basketry products; (*b*) spinning appliances and spinning products; (*c*) the loom and loom products; (*d*) sewing and netting appliances and sewing and netting products.
3. The sculptural arts. Illustrated by (*a*) implements for shaping stone, and products; (*b*) implements for carving wood, and carved products.
4. The plastic arts. Illustrated by implements for modeling in clay, wax, and other plastic substances, and plastic products.
5. Glass-making arts, utensils and appliances for glass making, and glass products.
6. The metallurgic arts. Illustrated by (*a*) metal-reducing appliances; (*b*) metal-shaping tools, utensils, and metal products.
7. The graphic arts. Illustrated by (*a*) drawing and painting, (*b*) writing, (*c*) engraving, (*d*) printing, (*e*) photography (appliances and products in each case).
8. Food-preparing arts. Illustrated by (*a*) contrivances for milling, (*b*) cooking appliances.

In the third group are implements of general use in the arts. Illustrated by (*a*) hammers, (*b*) knives, (*c*) scrapers, (*d*) saws, (*e*) axes, (*f*) adzes, (*g*) drills, etc.

In the fourth group are the arts employing natural forces, as—

1. The use of light and heat. Illustrated by (*a*) devices for striking fire, (*b*) lighting appliances, (*c*) heating appliances.
2. Use of animal power. Illustrated by (*a*) devices for harnessing men, (*b*) devices for harnessing animals.
3. Use of water power. Illustrated by (*a*) water wheels, (*b*) hydraulic engines.
4. Use of wind power. Illustrated by (*a*) sails, (*b*) windmills, (*c*) kites, (*d*) flying machines.
5. Use of steam power. Illustrated by the steam engine.
6. Use of electric power. Illustrated by (*a*) the electric magnet; (*b*) telegraphic transmitters, receivers, and insulators; (*c*) telephone apparatus; (*d*) motors.

In the fifth group are the metric arts:

1. Counting. Illustrated by tallies and computing devices.
2. Timekeeping. Illustrated by (*a*) sun dials, (*b*) hour glasses, (*c*) watches and clocks, (*d*) chronographs.
3. Weighing. Illustrated by (*a*) balance scales, (*b*) spring scales.
4. Measuring (linear). Illustrated by (*a*) linear scales, (*b*) dividers.
5. Surveying. Illustrated by (*a*) compass, (*b*) theodolite, (*c*) plane-table.

In the sixth group are transportation arts:

1. Land transportation. Illustrated by (*a*) devices connected with burden bearing, (*b*) sliding vehicles, (*c*) rolling vehicles, (*d*) wheeled vehicles.
2. Water transportation. Illustrated by (*a*) the vessel, (*b*) the sail, (*c*) the propeller, (*d*) the rudder.
3. Air transportation. Illustrated by (*a*) the sail, (*b*) the balloon, (*c*) the flying machine.

In the seventh group are the arts of war. Illustrated by (*a*) weapons, (*b*) armor, (*c*) fortifications.

In the eighth group are alimentary arts:

1. Eating and drinking. Illustrated by utensils and appliances.
2. Use of nicotine and narcotics. Illustrated by utensils and appliances for smoking, chewing, snuffing.

In the ninth group are costume arts. Illustrated by (*a*) dress, (*b*) jewelry, (*c*) tattooing.

In the tenth group are diversional arts, a few of which can be illustrated: (*a*) Games of skill—ball, etc.; (*b*) games of chance, dice throwing, etc.; (*c*) toys, dolls, etc.

In addition, other groups may be mentioned as follows:

Eleventh, the art of music. Illustrated by musical instruments.

Twelfth, religious and other ceremonials. Illustrated by idols, symbols, and paraphernalia.

Thirteenth, arts of exchange. Illustrated by coins and other forms of money.

Fourteenth, pathological arts. Illustrated by devices employed in medical practice and surgery.

These series may, when properly selected and arranged, afford striking and easily understood illustrations of the history of culture as recorded in material things. Some of the branches, such as building, weaving, and adornment arts, are of primordial origin, covering the whole range of progress, while others, such as printing, photography, the use of steam, electricity, etc., have arisen in recent times; but all furnish faithful records and striking proofs of the intellectual evolution of humanity.

The degree of elaboration in any branch of the exhibits must depend on the space available and the materials at hand. A few specimens may form an instructive synopsis, emphasizing the great steps of progress, while, on the other hand, a single branch may embody extensive series of objects, as is well illustrated in the collections of the Pitt-Rivers Museum, Oxford, where every available form of artifact is exhibited, covering not only the full range from lowest to highest, but indicating the forms peculiar to distinct peoples.

These series of exhibits, arranged to illustrate the development of culture in general, do not relate to any particular people or area, but represent all peoples and all areas. They can not, therefore, be installed in direct association with the geo-ethnic series, but must occupy a separate space in the museum.

Special culture series.—Two great classes of culture exhibits have now been described. First, the geo-ethnic series, illustrating groups of men and their works, assembled by geographical areas, and, second, the culture-history series, illustrating the achievements of the race in various important branches of activity. Now, it happens that there are numerous subjects worthy of museum illustration that can not be presented in either of these series of exhibits without confusion, and these, therefore, call for independent or isolated installation. It is proposed to group them under the head of special exhibits, and they may be as numerous and varied as we choose. Some of them may cover limited portions of the culture field, while others are general, comprehending a wide range. They may be classified and arranged in various ways according to the nature of the concept to be developed; some may be chronologic, some comparative, others cyclopedic, and so on. A national exhibit, that is to say, one intended to illustrate the history of a nation, may be arranged chronologically, as is the historical exhibit of our National Museum. Here the successive periods, marked by important episodes, are as follows:

(1) Discovery; (2) Colonization; (3) Revolution; (4) War of 1812; (5) Mexican war; (6) Civil war; (7) War with Spain, etc. Within

this series and forming part of it are special exhibits, as those representing public personages. In the section illustrating the Revolutionary period, for example, there is a minor exhibit relating to Washington, and consisting of various articles, arranged with a view to artistic effect or according to relative importance of the relics. This national exhibit is not a true geo-ethnic unit, since it represents only three or four centuries of the ethnic history of the area included, and, although arranged chronologically, it is not illustrative of the history of culture in the broadest sense.

A collection of paintings is susceptible of varied special treatment. It may be arranged (1) chronologically, (2) by countries, (3) by schools, or (4) by painters. An exhibit of bookbindings might represent the work of (1) an individual, (2) a firm, (3) a school, (4) a period, and so on.

Special comparative exhibits may be of much interest and value. They may be synoptic or cyclopedic. An exhibit of bows and arrows, for example, may be synoptic, containing only typical examples from the various regions and peoples, or cyclopedic, containing all available specimens from all sources.

The culture exhibits for a museum of anthropology may thus be best assembled in at least three distinct divisions, each illustrating a different kind of unit of culture and serving to convey distinct classes of information, or the same kind of information in different ways. So the museum space allotted to culture is separated into three parts, accommodating the geo-ethnic groups, the culture-history series, and the special exhibits.

Example of geo-ethnic exhibit.—The significance of the geo-ethnic exhibits, already described, will be readily understood by referring to fig. 5, a map of North America, on which are outlined in the most general way some of the principal geo-ethnic or geographical culture districts—the characterization areas of the continent. These areas are not always well defined, and there is a good deal of overlapping and ethnic intermingling. In some cases it is difficult to say of a particular area which tribe should be taken as a type, and the materials at hand must decide this, since only those tribes can be systematically shown from which collections are ample. In the main, however, the delimitations are sufficiently definite for all practical purposes. The areas suggesting themselves are as follows:

- I. Eastern Arctic area (Eastern and middle Eskimo).
- II. Western Arctic area (Western Eskimo).
- III. McKenzie-Yukon area (Tinneh).
- IV. Northwest coast area (Tlinkit, Salish).
- V. Columbia River area (Nez Percé, Chinook).
- VI. California area (Klamath, Tulare).
- VII. Great Basin area (Bannock, Ute).
- VIII. Colorado-Rio Grande arid area (Pueblo, Apache).

- IX. Great Plains area (Blackfoot, Kiowa).
- X. Great Lakes and North Atlantic area (Chippewa, Iroquois).
- XI. South Atlantic and Gulf area (Seminole, Choctaw).
- XII. Arkansas-Texas area (Wichita, Caddo).
- XIII. Northeast Mexico and Rio Grande area (Coahuiltec).

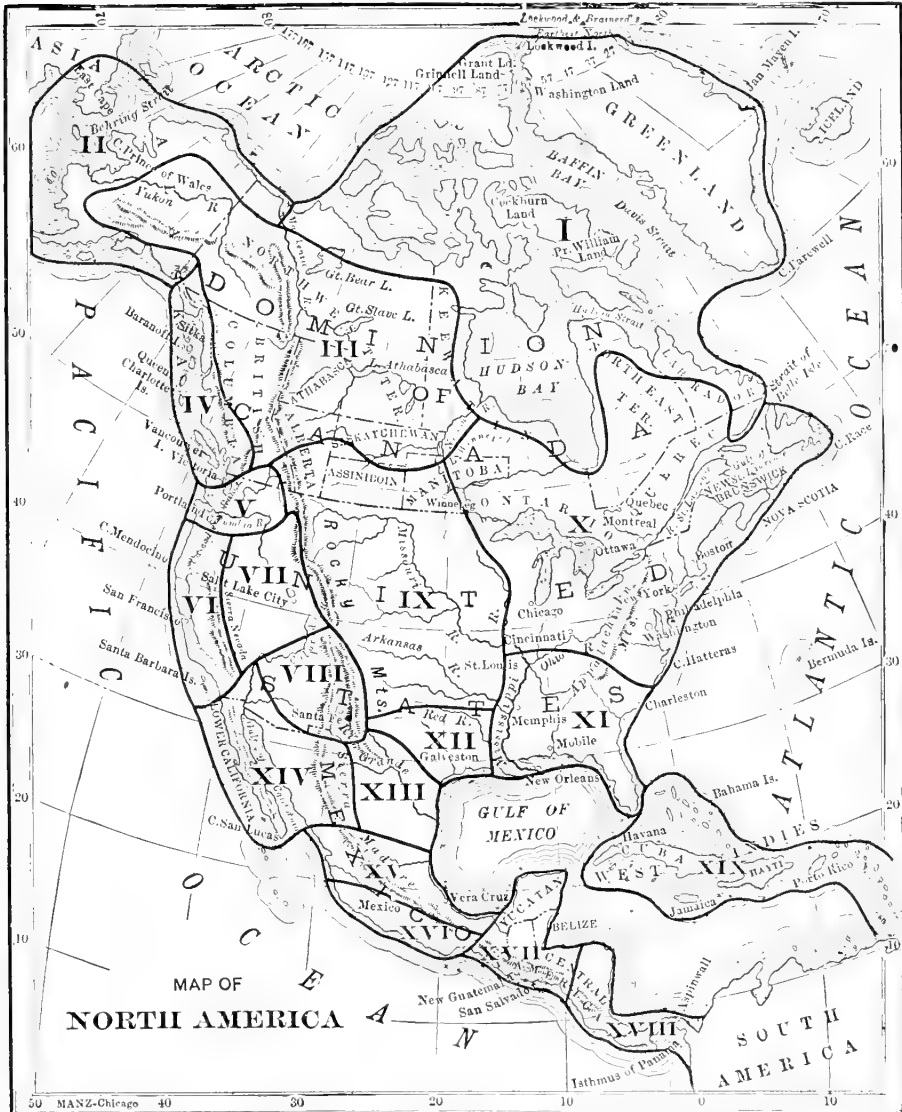


FIG. 5.—Map of North America, indicating in a general way the geo-ethnic provinces.

- XIV. Sonoran area (Mohave, Huichol).
- XV. Central Mexican area (Aztec, Otomi).
- XVI. South Mexican area (Zapotec, Mixtec).
- XVII. Yucatan-Guatemalan area (Maya, Maya-Quiché).
- XVIII. Costa Rican-Isthmian area (Mosquito, Chibcha).
- XIX. West Indian area (Carib, Arawak).

In all these cases we deal exclusively with the native ethnology, as the superposed European culture is too widely distributed to be treated by limited districts, and transportation from region to region is now so easy that a particular or peculiar environment is no longer capable of impressing its stamp upon its people and art. Modern culture has to be treated by artificial, not natural, areas, and is becoming so generalized that distinctions of art are disappearing, and we must illustrate it, if we illustrate it at all, in one cosmopolitan group. But, referring to the native history, let us see what these culture areas mean.

It must have been an untoward chain of circumstances that drove the Eskimo peoples into the frozen zone (areas I and II, fig. 5) occupied by them, for at first glance it would seem that human creatures could not survive even for a year in such an environment; but they found means of living, and withal are a healthy and energetic people. But their culture is necessarily very circumscribed and exceptional, developed in and modified by the peculiar surroundings as it was. These people have clothing, but as the garments are necessarily of skins and furs the textile art is almost unknown. They must also have fire, but their fuel is oil. They venture out in boats to capture the seal, but as they have little wood their boats are made of skins and are distinct from the boats of other groups. They travel by land also, but their vehicles are on runners and are made of driftwood and bone. They hunt game, but as this consists chiefly of marine animals they have invented peculiar weapons and appliances. They build houses, but these are unlike those of any other climate in the world, being often made of whale bones or of frozen snow. They carve quaint figures in ivory, bone, and wood, which have no parallel among other peoples. They have no pottery, partly because the climate is not favorable to its development, but also because they have soapstone pots. Notwithstanding their most dreary and inhospitable surroundings, they are a clever people and invent and use the most cunning traps, snares, and weapons in the world. They are cheerful, also, and enjoy existence in their way as keenly, perhaps, as the more favorably situated peoples.

Can the culture phenomena of any other region or climate be as peculiar and remarkable as this? Strange to say, this is not a rare instance of individuality in culture development and characteristics. Take the area marked IV on the map and note what strange contrasts occur. Area I has no wood, but in area IV wood abounds; there the great cedar and the shapely spruce grow, and the ingenious tribes of Indians have used them extensively. So important a feature of this environment are they that the culture phenomena—the arts—are largely regulated by them. The people go to sea in boats, but they are not boats of skin, they are made of the noble spruce trunk, and the stable craft are well shaped and beautifully carved and painted. The people live in houses, but these are not of snow or whalebones, but of

wood of the hemlock. Their houses are also works of art, with carved and painted ornaments, and are supplemented by wonderful totem poles sculptured in the most fanciful forms. The hemlock, the cedar, and the spruce have made these peoples a race of builders and sculptors. They do not wear skins exclusively, but have woven garments, because the cedar bark and the wool of the mountain goat make the textile art easy. They do not make pottery, but they carve the yellow spruce into ornamental vessels, spoons, and chests, and they have transferred their skill in carving to stone, and are now veritable sculptors, made so because the forest trees of this particular environment dictated the lines in which many features of their culture should grow.

It is unnecessary to go further into details, as the reasons are clear for assembling our ethnic collections by geographic areas, and it only remains to indicate in some detail how these collections are to be grouped and displayed in the museum.

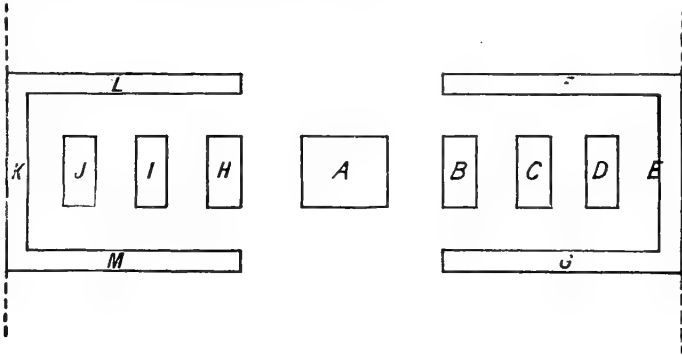


FIG. 6.—Diagram of Eastern Eskimo ethnic museum unit. *A*, Lay-figure group, case 8 by 12 feet. *B*, House models; *C*, Boat models; *D*, Sledge models, harness, snowshoes; etc.

In the accompanying diagram (fig. 6) we have a scheme for arranging one of the geo-ethnic units. The area selected is that of the Eastern Eskimo (area I on the map). In the center of the exhibition hall we place the group of life-size figures, *A* (fig. 6), showing how the people look, and, as far as possible, what they think and do and have. This is the key to the exhibit, the most essential idea, the feature from which the most casual observer can get a definite conception of the people and their culture. The particular episode depicted in the group shown in fig. 7 was selected for the purpose of illustrating, amongst other things, the cheerful disposition of these farthest-north people. Then, ranged around this group, should be cases containing everything that will serve to indicate more fully and accurately the nature of their activities and culture. Case *B* should contain models of the various forms of dwellings—the snow house, the earth-covered hut, and the improvised shelter, with all varieties of attendant structures; case *C*, models of their boats, while actual examples may be placed near at hand if space permits; case *D*, their sledges, snowshoes,

etc., the sledges represented mainly by small-scale models; case *E*, their hunting weapons, traps, and snares; case *F*, their fishing implements and apparatus; case *G*, their knives and other tools of general use; case *H*, their lamps; case *I*, their carvings and graphic art; case *J*, their clothing and personal ornaments in detail; case *K*, their toys, dolls, and masks, and so on. A reasonable space should be devoted to crania, casts from life, and pictures showing physical characters. Such archaeological material as pertains to the region should also be shown. In instances where there are striking distinctions between the Northern, Central, and Labrador groups of these Eskimo, duplicate



Fig. 7.—Family group of Eastern Eskimo.

exhibits should be installed and separate lay figures of men, women, and children should be prepared to illustrate important variations in physique and costume. The manner of arranging the specimens of the several exhibits in their cases is necessarily much varied and it does not seem advisable to enter further into the details in this place.

The labels required in this ethnic unit are as follows: (*a*) A sign, about 12 by 36 inches, to be suspended above the exhibit, serving to correlate it with the associated units in the museum series:

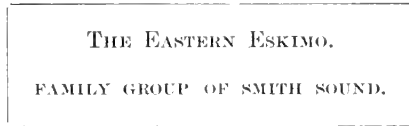
(*a*,)

ABORIGINES OF NORTH AMERICA.

THE ESKIMO.

(b) Case label, about 5 by 16 inches, to be framed and placed on or immediately above each case to designate its contents in a general way and expressive of the broadest classification. The case label for the family group is as follows:

(b.)

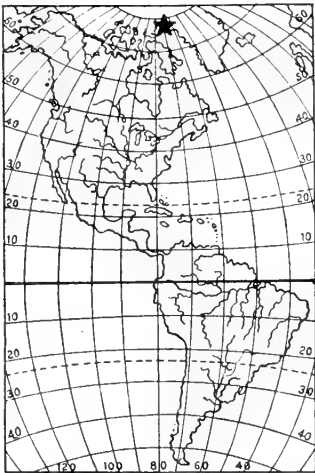


(c) Descriptive label, about 8 by 10 inches, two copies to be framed and hung in each exhibition case near the level of the eye. That for the family group is as follows:

(c.)

FAMILY GROUP OF THE SMITH SOUND ESKIMO—TYPE OF THE EASTERN ARCTIC REGION.

This exhibit shows an Eskimo family of Smith Sound, in northwestern Greenland. The Smith Sound Eskimo are called the Arctic Highlanders and are the northernmost people in the known world. On account of the prevalence of ice they do not have the kaiak, or skin canoe, but use the



dog sled for transportation. Their clothing is of skins of seal, reindeer, birds, and dogs, and their houses are of snow. Nearly all of their activities are associated with the struggle for existence, and little attention is given to art work.

This group represents the family as it might appear, in the spring, moving across the ice fields. The young man has succeeded in clubbing a small seal and the others are having a laugh at his expense for calling on the dog team to haul it home when he could have carried it on his back. It is remarkable that these farthest north people are exceptionally cheerful in disposition, notwithstanding the rigor of the climate and the hardships of their life. The

woman, who carries a babe in her hood, is about to help attach the seal to the sledge; and the girl, who plays with the dogs, and the boy, who clings to the back of the sledge, enjoy the confusion of the young hunter.

Designed by W. H. Holmes; modeled by H. J. Ellicott.

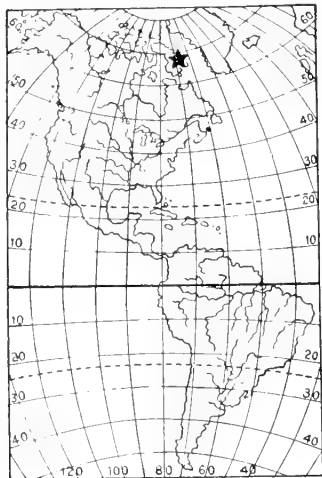
Besides the case label and the general descriptive label, which go with each exhibit, referring to it as a whole, all the exhibits save the family group require labels for the individual specimens. One

example of these specimen labels, taken from the dwelling group series, may be given:

(d.)

DWELLING GROUP OF THE CENTRAL ESKIMO.

The Central Eskimo live on the area between Hudson Strait and Baffin Bay. Their winter houses are built of blocks of snow laid up in a spiral



manner, forming a dome. The blocks are about 3 feet long, 2 feet high, and 6 inches thick. The main chamber of the house varies from 5 to 12 feet in height, and from 7 to 15 feet in diameter. Over the entrance a square is cut out and the hole is covered with seal intestine for a window. The principal room is connected by passages with one or more storage rooms. In summer the natives fish in the open water; in winter seals are taken by nets set under the ice. Dogs are attached to the sled by separate lines. The clothing of the men and women is made from skins of seal and deer, and consists of outside and inside trousers; jackets, those of the women having hoods; boots, and inside boots or socks

made of light deerskin or birdskin.

This model forms one of a series designed to set forth the dwellings and home life of native tribes in the Western Hemisphere.

Example of culture-history exhibit.—The nature of the geo-ethnic or specialization area assemblage of the culture materials of the world has been sufficiently shown in the preceding pages. It is the first and most important method for a general museum. It remains now to explain briefly the nature of the culture-history installation, a partial list of the available exhibition units of this class having already been given.

In fig. 8 we have a scheme for placing and labeling a series of exhibits illustrating progressive steps in the art of sculpture in stone. The other series are to be treated in like manner. This art began very early in the career of the race and in forms so simple that they would not at first be recognized as belonging to the art of sculpture by the unscientific student. We are able to trace it more fully than any other art because its products are stone, which is not seriously affected by lapse of time. Then again the tribes and nations of to-day are found to be practicing every known step in the art from the most elementary to the most highly perfected, so that its whole history comes well within the range of present observation, and examples of the tools and the work are available. The first conscious step in the art was probably that of fracturing one flinty stone with

another, with the view of securing a sharp edge for cutting and scraping. Three other processes that must have come early into use are shaping by pecking, by grinding, and by cutting, and for a long period of human progress the only sculpture consisted of shaping useful implements by these methods. Even to-day these are the processes used, the tools and appliances being simple with primitive people and more highly developed among cultured nations. Mechanical aids of considerable complexity are sometimes employed by our modern sculptors.

The first group of exhibits illustrating the history of the art may well consist of a progressive series of the shaping implements and devices, while two or more additional series may show the sculptured products.

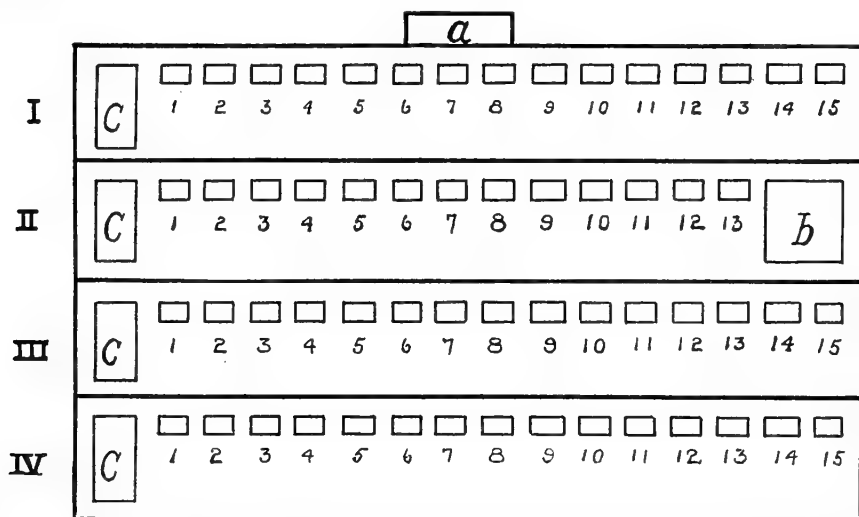


FIG. 8.—Arrangement of a synoptic exhibit illustrating the history of sculpture as elaborated in the U. S. National Museum. I. Series of tools and appliances. II. Series of aboriginal American sculptures. III. Series of oriental sculptures. IV. Series of Mediterranean sculptures. *a*, Case label. *b*, General descriptive label. *c*, *c*, *c*, *c*, Series labels. 1, 2, 3, etc., Specimen labels, associated directly with exhibits.

In the first stages of the art only simple, useful articles were made; later these were elaborated esthetically and personal ornaments were added; then gradually the processes were applied to working out the rude, block-like, imperfectly proportioned figures of animals and men; these were totems, fetiches, and idols, and illustrate a third stage in our progressive series. Later still portraiture was attempted, and a kind of rigid, formal likeness was worked out, marking a fourth step. Then with the higher nations correct form and expression came into being, and finally the realistic and ideal work, represented by the highest Greek art, was developed. Exhibits illustrating the more advanced phases should embody originals of the smaller objects and small-scale reproductions of the larger. If collections are ample, it

will prove interesting to treat the development of the art in each continent or great cultural province separately, in the manner indicated in fig. 8, thus affording facilities for interesting comparative studies. America may furnish one series of exhibits in which the course of development through the several primitive grades up to the stage of well-relieved figures and rude portraiture is traced (say 16 numbers). The Orient may afford a series somewhat more complete (say 18 numbers), and the Mediterranean province yields illustrations covering the same ground, and besides furnishes additional steps up to the highest achievements of human genius in this art (say 20 numbers).

Four kinds of labels are required for the sculpture exhibit, as follows:

(a) Case label, about 4 by 16 inches; framed and placed at the top of the case. (a, fig. 8.)

(a.)

HISTORY OF THE ARTS AND INDUSTRIES.

SYNOPSIS OF THE ART OF SCULPTURE.

(b) Group label, descriptive of the entire exhibit; size about 8 by 10 inches; framed and hung at a suitable height within the case. (b, fig. 8.)

(b.)

HISTORY OF SCULPTURE.

The term "sculpture" is here applied to the whole group of processes and products pertaining to the shaping of stone, but does not extend to the carving of wood, bone, ivory, or other like substances, the modeling of plastic materials, or the shaping of metals. The products of the art, briefly epitomized in this exhibit, constitute an important record of human progress, for they not only tell a story of technical and industrial development, but throw many side lights on the history of religion, esthetics, and general culture. It is observed that with very primitive peoples the shaped forms are implements and utensils merely, but that with advancing culture ornaments are made and life forms gradually appear, and that in civilization realistic and ideal phases of the art are dominant.

In this exhibit we have to deal with two classes of artifacts—first, the implements and appliances used, and second, the shaped product. The shaping processes include flaking, pecking, cutting, and grinding in their various forms, and the implements and devices used are in the main extremely simple, even in the advanced stages of the art. The implements are arranged in progressive order in series 1, and the sculptured product in some of its varied phases in series 2, 3, and 4. Series 2 indicates the range of native American work; series 3 the sculpture of the Orient, and series 4 the full range of the art as developed on the shores of the Mediterranean.

(c) Series label, to be placed at the beginning of each series. The following example pertains to series II of the sculpture exhibit. (Fig. 8.)

(c.)

SERIES 2.—ABORIGINAL AMERICAN SCULPTURE.

The American tribes displayed a strong predilection for sculpture. They shaped their stone implements with great skill, and delighted in representing animal forms. Religious motives inspired most of the more elaborate work, although esthetic appreciation was not wanting.

The series of objects here presented covers nearly the full range of native achievement, although the best examples shown fall short of the highest types of Aztec and Maya work. The simpler forms are placed at the left, and a series of progressive steps lead up to the higher forms at the right. It is believed by some that germs of culture have occasionally reached America from other lands and that sculpture on this continent is not wholly of native growth.

The practice of the art in its higher forms has, for the most part, been abandoned by the native tribes, but stone implements and utensils are still made in some remote districts.

(d) Specimen label, briefly describing the specimen, and placed with it in each instance. The following examples belong to specimens 13 and 14 of the American series (II, fig. 8), as installed in the National Museum.

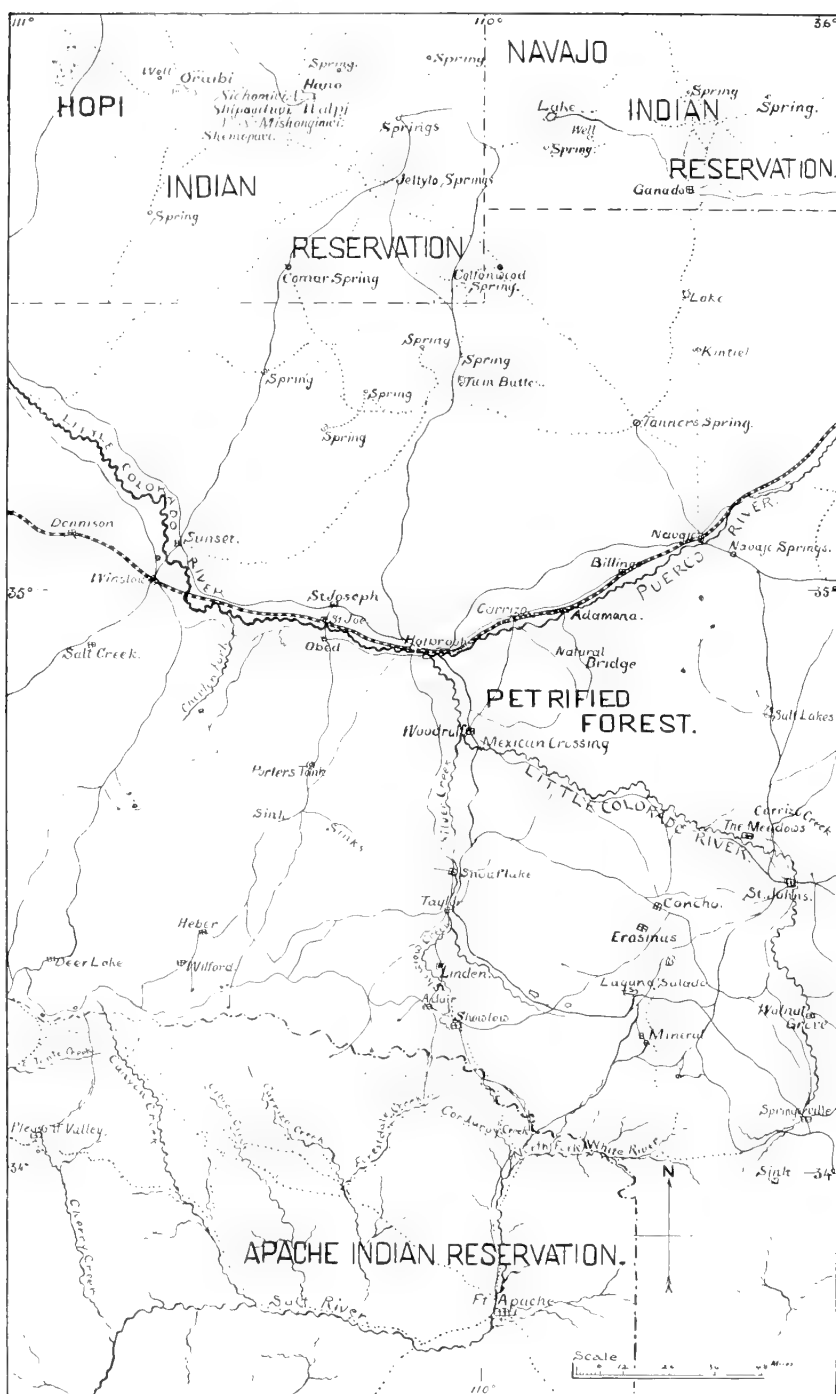
(d.)

No. 13.—Human and animal figures combined in a miniature totem pole; sculptured in partial relief. Material, black slate; shaped with metal tools. Northwest Coast Indians. Period recent. 178064.

No. 14.—Human figure, fully relieved, but falling short of the best Central American work. Material, gray, porous lava; probably shaped with stone tools. Pre-Columbian period. 61814.

The ends to be subserved by the exhibits of a general anthropological museum are mainly those of education, and the aim of the classification and arrangement here proposed is to so present the collections that the student, as well as the ordinary museum visitor, may secure the maximum benefit from them. As has been indicated at length in the preceding pages, the three great ideas capable of satisfactory presentation are: (1) The biology of the race—the origin, evolution, and

present characteristics of physical man; (2) the ethnology of the race—the various groups of people and their culture; (3) the history of culture—the evolution of arts and industries. To these three series a fourth is added, which consists of various special exhibits, each teaching its individual lesson. The anthropological collections are thus assembled in four grand divisions separately installed and intended to convey distinct and important lessons of human history.



GENERAL MAP OF THE REGION.

ARCHEOLOGICAL FIELD WORK IN NORTHEASTERN ARIZONA.
THE MUSEUM-GATES EXPEDITION OF 1901.

BY

WALTER HOUGH,

Assistant Curator, Department of Anthropology.

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ARCHEOLOGICAL FIELD WORK IN NORTHEASTERN ARIZONA. THE MUSEUM-GATES EXPEDITION OF 1901.

By WALTER HOUGH.

Assistant Curator, Department of Anthropology.

INTRODUCTION.

Early in the spring of 1901 the writer was ordered into the field to conduct ethnological and archeological investigations in northeastern Arizona. (See Plate 1.) The plan settled upon embraced two distinct explorations, the first during the month of May, for the United States National Museum alone, and the second from June 1 to August 30, for the Museum in conjunction with Mr. Peter Goddard Gates, of Pasadena, California, whose interest in the exploration of the Southwest has been productive of excellent results for science.

Field work began on May 3, and making Holbrook, Arizona, the base, the McDonalds Canyon ruins to the southeast of that place were visited and explored. The remainder of the month was spent at the Canyon Butte ruins east of Holbrook in a thorough reconnoissance of the Petrified Forest Reserve and a visit to the ruins north of Holbrook. These groups of ruins are new to science, and the results of the explorations are very satisfactory.

On June 1 the Museum-Gates expedition took the field, selecting for exploration a large ruin a few miles east of the Petrified Forest. On the completion of this work the party returned to Holbrook and went south into the White Mountains, reaching, on June 19, the ruin at Linden. On June 26 the party camped on the great Forestdale ruin on the White Mountain Apache Reservation. On July 9 a small ruin at Interior Sawmill was investigated, and after a visit to Fort Apache the expedition returned to Showlow, working for a day or two a large ruin on the ranch of Mr. Henry Huning. Returning north, ruins at Shumway, Snowflake, and Woodruff were examined, Holbrook being reached on July 17.

Here the party renewed its supplies and was joined by Mr. A. C. Vroman, the well-known photographer of Pasadena, who remained taking many views till the close of the season.

July 29 found the party engaged in excavating a large ruin called Kokopnyama, on the Jettyto Wash, 2 miles east of Keams Canyon. On August 11 a ruin near Jettyto Spring called Kawaiokuh was worked for a week, when the party closed excavation and proceeded to the Hopi pueblos for ethnological studies, remaining there till the 28th, when the Museum-Gates expedition disbanded.

The writer returned to Holbrook to complete the packing and shipping of the specimens secured. During September 12-14 the groups of ruins on the Le Roux and Cottonwood washes were carefully platted and plans of the sites made. This closed up the season, and on September 23 the writer returned to Washington.

In addition to the avowed objects of the expedition, collections of plants, fossils, minerals, etc., were made, Mrs. Gates aiding materially in the botanical work. A large series of photographs was made by Messrs. Vroman, Gates, and the writer.

The groups of ruins described in this paper are treated geographically, beginning, for convenience, with the southernmost, at Forestdale. Taking the more important sites in order to the northward, we have Forestdale, Linden, Showlow, Shumway, McDonalds Canyon, Scorse Ranch, Petrified Forest Reserve, Biddahoochee, and Jettyto Valley. This line of archeological reconnoissance shows in an interesting way the prevalence of red and gray pottery south of the Little Colorado and Puerco rivers, with exceptions at Shumway and Stone Axe, gray ware in the Little Colorado Valley, and yellow ware at Biddahoochee and Jettyto Valley. Thus we may divide the field explored into three regions, namely: (1) Region of the White Mountains, red and gray ware; (2) region of the Little Colorado Valley, gray and red ware, and (3) region of the Hopi buttes and mesas, yellow and little red and gray ware. In detail the ruins examined in the region of the White Mountains are Forestdale, Interior Sawmill, Linden, Showlow, Shumway (yellow and red), Snowflake, Woodruff Butte, Canyon Butte, Petrified Forest, Metate ruin, Stone Axe ruin (yellow ware), and Adamana. Those of the Little Colorado Valley are McDonalds Canyon and Scorse Ranch, and those of the Hopi buttes and mesas are Biddahoochee and Jettyto Valley.

The environment of the three regions is semiarid. The White Mountain region, however, from the height and mass of the range, especially the Mount Thomas condensing focus, has greater rainfall than the other regions. For this reason there is here abundant vegetation, and in the radius of this influence and in this respect the environment seems more favorable for human habitation. On the other hand, geological causes have determined the lack of springs on the north side of the range, and dependence must be put on fluvial waters. South of the Mogollon Rim springs are abundant, and here were located important pueblos like those of Forestdale and others in the Apache Reservation.

The conditions in the valley of the Little Colorado are similar in regard to available water supply to that of the White Mountains, but the region is more arid and the vegetation is of desert types, the cottonwood along the stream beds being the only tree.

The region of the Hopi buttes and mesas has an elevation of about 6,500 feet, 1,500 feet above the Little Colorado Valley. Geological causes here also determine the numerous springs in this region, the rainfalls being stored in sandhills or in the heavy strata of porous sand rock underlaid by shales, which brings the water to the surface. This region is practically uninhabitable without corn, which is grown in the beds of the washes and depends on local rains for irrigation. The same remark is true of the second region, while in the White Mountain region hunting tribes could exist.

WHITE MOUNTAIN REGION.

FORESTDALE—INTERIOR SAWMILL—LINDEN—SHOWLOW—SHUMWAY.

FORESTDALE.

On the White Mountain Apache Reserve, southeast of Showlow some 10 miles, and a few miles east of Pinetop, near the headwaters of a creek rising in the Mogollon Mesa, is a remarkable ruined pueblo, which, from its great extent, must have been an important center of population in early days. (Plate 2.) The Apaches call the place "Tun das tusa" (water spread out), from the many springs forming marshy areas. The locality is called Forestdale from the creek of that name. Years ago Mormons made a settlement here, but the Apaches drove them away, burning their buildings except the church, which still remains, surrounded with great pines. The ruin was brought to notice by Bandelier, who hastily examined it in 1883."

The country slopes strongly to the south from the Mogollon rim, and the streams drain into the Upper Salt River, which flows approximately 25 miles to the south. This portion of the White Mountain Apache Reservation is rugged, the streams often canyoned and again running through pleasant valleys, with meadows and Indian cornfields. The primitive forest of great pine trees covers the country; grass is abundant, and wild flowers bloom in profusion, giving one an idea of the "Tierra despoblada" as it appeared to Coronado and his followers when they passed through this region in 1540.

The problems of food, water, wood, clay, and stone which were so difficult to most tribes in other portions of the Pueblo region presented no such complexity to the ancients of Forestdale. Most of these good things were near at hand in greater degree than at the

"Final Report, etc., 1880 to 1885. Papers of the Archaeological Institute of America, Cambridge, 1892, Pt. 2, p. 400.

neighboring pueblo of Linden; wood was rather a burden, cold, clear water welled beneath their town walls, the rich cornfields required no irrigation, the forest was full of game; manzanita berries and the sweet mescal agave were plentiful. It is not surprising, therefore, that in this favoring environment pueblos of large size were developed; the cause for wonder is that in this region the pueblo dwellers have not persisted to our day.

Tundastusa ruin (Plates 3 and 4) is located on a low elevation between two washes coming into Forestdale Creek from the north, on land claimed by Skidi, a prominent Apache, who has his cornfields near the mouth of the washes where there are springs.

At the highest point is a circular acropolis 160 feet in diameter, giving the area of 1 acre, the walls 2 feet thick and 8 feet 2 inches from the surface to the foundation course, the circle cut up into rooms by narrower walls. At intervals down the slope below the acropolis toward the creek and wash are five or more walls, forming segments of circles concentric with the acropolis circle. Across these segments run radiating lines, showing from a distance as windrows of stone from the fallen buildings. The only plaza in this section of the ruins is a small one on the southeast side. Attached to the acropolis on the west are quadrangular house masses, the general ground plan being irregular or stepped and extending down the slope. Beyond this section of the pueblo to the west is a long L, two rooms deep, containing 104 rooms. On the inner side of the north limit of the L is a parallel row of houses, also two rooms deep. These house rows thus flank two sides of a plaza 1 acre in area, and bounded on the south by a low wall. At the east end of the inner house row a sunken depression 25 feet square probably indicates a kiva, though excavation revealed nothing. (Plate 5.) A curved wing wall closes the opening between the acropolis and the detached quadrangular ruin. This portion of the Forestdale ruin is easily traced. The ruin is estimated to show 300 rooms on the ground floor and perhaps originally contained 1,000 rooms. In area, it covers 7 acres, and its present appearance is that of chaotic heaps of earth and stone, with no walls standing above the surface. (Plate 6.) There are no trees on the ruin. The plan of Forestdale ruin shows three house masses, which strike one immediately as having been constructed at different times. There is no doubt on this point concerning the rectangular ruin some distance to the west; but in order to determine the relation of the house mass attached to the circular ruin the walls at the junction were cleared and it was found that the wall abutting the acropolis rested on 3 feet of rubbish, which had accumulated from the older pueblo. The walls of the middle pueblo are likewise of inferior masonry, not as good as that of the rectangular house mass. It is apparent that the circular ruin is older and formed the nucleus of subsequent accretions. As has been stated,

the artifacts noted in the débris are uniform for the whole site. It must be said, however, that no cemeteries were discovered in connection with either of the rectangular house masses. It seems probable that since all present pueblos are made up of aggregations of clan units, we see in Forestdale an ancient evidence of this fact, which may also explain the occurrence of two modes of burial.

The material used in building is sandstone brought from the ledges cropping out along the little creek close at hand. The blocks of stone are larger and more uniform in dimension than is usual in the pueblos of the Southwest. In general the stones were of convenient size for carrying by one man, but larger stones were used in the circular walls. One measuring 3 by 2 by 2 feet and weighing probably 1,000 pounds was observed set in the wall at the height of 5 feet. As it is not possible for men to lift a stone to this height by muscular effort, it is probable that it was rolled to position on an earth embankment or a skid of poles. It will be perceived that men who could construct a circle with an accuracy that is comparable only with the work of men possessing instruments of precision would also show skill in masonry. In the course of the excavation the exterior of the acropolis wall was exposed for a length of 164 feet, showing masonry that excites admiration and surprise. (Plate 7.) Like all cyclopean construction, of which this wall is a type, the stones are rough bedded and not coursed. The wall is laid up with judgment, the joints broken, and large stones the width of the wall form headers. Occasionally a series of large stones forms what appears to be an attempt at a course. The stone are quarry faced, and projections beyond the line have been pecked away and a few petroglyphs cut on some of the stones. Some of the building blocks scattered over the ruin have fret and key designs pecked on the surface. The walls of the room interiors have in a number of cases where such walls were seen been carefully surfaced with the pecking hammer and the chinks set with small stones. Other rooms have been plastered with red clay; low doorways formed a means of communication between the rooms. In excavating the circular wall a very narrow entrance was found leading through it at the northeast.

As usual in the southwest, Forestdale is one of a group of pueblos, a member of which lies a few hundred feet to the northwest on the edge of the bluff. Another very large ruin is about one-half mile away on the line of the valley; a third, comparatively small, stands on the bank of the creek half a mile up the valley, and still another small ruin is on a sandstone cliff on the left bank. No detached houses were observed, nor were altars, shrines, or fire boxes noticed. The surface of Forestdale ruin shows traces of modern occupation, such as remains of foundations of Mormon houses, shallow basins marking the location of Apache wickiups, while on the acropolis circles of stones mark the

rifle pits thrown up during intertribal warfare among the Apaches some years ago. (See Plate 6.)

The débris surrounding the walls and obliterating the rooms is enormous in mass, greater than that surrounding any ruin in the Southwest known to the writer. This débris consists of ashes and charcoal mixed with bones, pottery, fragments, etc., which has altered the contour of the land around the pueblo to a marked degree. Pottery fragments are relatively fewer than in most other ruins, while bones of animals are quite frequent.

One cemetery lies on the east hillside, where a sandstone ledge crops out above the spring. This cemetery had been rifled by Skidi and others. The pottery secured by Skidi, he says, was sold to Mr. Schott, formerly agent at Apache. It is evident that burials were made at length in this cemetery, but the pottery, judging from the fragments, does not differ from that scattered over the ruin. There was no opportunity to ascertain whether cinerary burials occurred in this cemetery, but it was gathered from Skidi that such burials had been uncovered.

The collection secured by the Museum-Gates expedition at Forestdale was taken from a burial place along the free portion of the circular wall of the acropolis, marked in the plan. (Plate 3.) The burials here were from 5 to 8 feet, 2 inches below the present surface, and directly against the wall. Two varieties of interment were also encountered here, namely, a few bodies flexed and placed against the wall; the majority burned and placed in gray vases, which were luted with clay, stopped with a stone, or covered with an upturned bowl. A remarkable fact connected with the interments of this class is that the vases are usually set on the bones of an infant. No explanation derived from historical or present observances of any of the pueblo tribes can be given of this strange custom, which appears to have been of sacrificial character. It may also be said here that this is the most northerly occurrence of incineration that has yet come to notice. Fragments of a paho, painted green, were found on the ashes in one of these vases and a very much corroded mass of copper, which appears to have been a bell. Among the calcined bones were fragments of awls, showing that possessions were burned with the body. The ashes of a young person were inclosed in a bird-form vase. (Plate 8, fig. 1.) The flexed burials contained pottery, according to the general custom, the ware being red. Quantities of fragments of red bowls were thrown out of this excavation, and some fragments of cooking vessels in rugose ware, having wide, flaring rims, were seen.

The Forestdale pottery is red and gray in color, the red preponderating. It is found that the paste of both varieties is the same, the red ware being secured by covering the gray paste with a slip of yellow ocher burning to red color. The red ware is found in form of bowls, dippers, and small articles; the decoration geometric rain clouds and

terraced figures; the volute and key frets are missing. Several small objects of the highest artistic importance were collected. These comprise a paint cup of oblong shape (Plate 9, fig. 1), a handled vase, a small bowl, and a double bowl (Plate 9, fig. 2) of bright and lively red color; the designs geometric in black enamel, outlined with white and sometimes with black over a white ground.

The unique vessel formed by joining two bowls is remarkably attractive, even though broken. The potter has lavished on this object her highest skill, and the result is an achievement in polychrome ware which probably marks the highest attainment in ceramic art from the Southwest. We may follow the construction of this vessel with a view of explaining the processes involved. The potter formed two bowls of selected clay and joined them while "green" by a short neck connecting the rims. She then washed the vessel with fine yellow ocher and finished the surface with a smoothing stone. The interior of one of the bowls was washed with cream-colored kaolin and also smoothed with the stone. Having prepared her pigment for the black enamel, the basis of which is iron ore, but the secret of its mixing, whether with alkaline salts or resin, is lost, she skillfully laid on the interior of one of the bowls a geometric design and on the exterior rims of both various geometric frets, outlining the latter designs with stripes of pure kaolin. The interior of the second bowl required the preparation of a second color, which should burn to soft gray and melt into the background. The vessel was then fired, care being taken to prevent uneven firing and smoke blemishes. The result shows a knowledge on the part of the potter of materials, manipulations, and processes, from the selection of the clay to the last stages of firing, and a highly developed artistic sense in form and color that command our respect and admiration. That similar feelings toward the skillful potter were entertained among ancients of the Southwest is shown by a series of objects taken from a grave at Four Mile by the Fewkes party in 1897. Carefully placed in this grave were all the implements of the potter's craft, concave dishes, representing the beginning of the wheel in which the ware was set during manufacture, smoothing stones, a stone slab, and a mulling stone and grinder. Securely laid in a large, well-made cooking vessel, on a bed of pine twigs, were various kinds of clay and paints. Gourd formers and brushes of yucca strips, if any such were buried, had decayed. With these objects were specimens of excellent pottery. The purpose of this disposition seems clearly to furnish this venerated potter the implements with which she might continue her art for the benefit of the spiritual beings in the under heaven.

One piece of ware of the Gila type (Plate 10, fig. 1) and several fragments were all the examples of this type found at Forestdale. It is evident that the ruins on the north slope of the White Mountains

show strong Gila influence and are little related to the remains on the Salt River. One fragment of yellow ware with black and light-red ornamentation was picked up. The black on the specimen is thick and enamel-like. But one fragment showing white painting over a rugose surface rewarded the most careful search. Some fragments of ware resembling that of Four Mile have portions of designs of human figures in white kaolin. Symbolic designs are infrequent, birds, bear tracks, and a face on a red dipper comprising all such figures noted.

Gray ware. Shards of gray ware are rare in the débris at Forestdale, so that the number of vessels found was to some extent unexpected. The comparatively small number of shards may be due to surface conditions, as in this region the ground is held by plants and moisture, while on the plains the prevalence of shards may be due to winnowing of several feet of soil by erosive agencies. The greater number of pieces of gray ware were vases of globular form (Plate 11, figs. 1 and 2), or of bird form containing incinerated bones (see Plate 8, fig. 1). None of the vases have handles as those from Linden and Showlow; one urn has an animal handle, several of which, broken from vessels, were taken from the débris. A few small bowls of gray ware were also taken out. (Plate 8, fig. 2.) A portion of a gray vessel bearing in relief apparently a snake, is an example of a class of decoration very rare in the pueblo region, but prevalent in Mexico and found sparingly on the Gila River. The bird-shaped vessels are more conventional in treatment than those found north of the divide in the drainage of the Little Colorado. Some figurines of animals in pottery, perhaps fetiches, occur at Forestdale. They are rudely executed and without decoration. A dipper with rattle handle came from this ruin. Rugose cooking vessels are few in number and of small size. Roundels of reground pottery are frequent; one such piece may have been a spindle whorl.

Stone.—The absence of metates from the surface, coupled with the presence of broken manos, was remarked at Forestdale, and it was learned that the former were carried off by Indians who make use of them around their camps, only working out a metate if an ancient one can not be secured. The Apaches also collect hammers and other stone implements from the ruins, which in many cases explains the paucity of such relics on ruins visited by them. While excavations brought to light metates, no axes and few hammers appeared, and arrowheads were infrequent. Chert flakes formed into scrapers and knives were numerous, one scraper chipped and ground being specially noteworthy. Chips of black and white obsidian and an occasional scraper of this material were noticed. A small boring implement of red chert is figured. (Plate 12, fig. 4.) A small paint pestle with traces of copper pigment on the rubbing end may be mentioned.

Pottery polishing stones, an arrow smoothing stone of Gila type, and a stone resembling a fetich (Plate 12, fig. 2) were taken out. The stone last mentioned has been carefully worked from a dark, greenish-blue rock much prized by the ancient people of the Upper Gila, numerous specimens having been found in Pueblo Viejo Valley^a where the material appears to occur *in situ*. Sporadic examples of objects cut from this stone are found north of the mountains, and one specimen was collected by Mrs. M. C. Stevenson at the Hopi villages. A small tablet of sandstone, having a design in black on one face, was excavated from this ruin. No conjecture is ventured as to the purport of the plan on the tablet, except to say that the ancients at Forestdale evidently drew circles as well as built them.

Shell.—Shell appears to have been little used at Forestdale, only a few pieces, consisting of whistlets and pendants, rewarding the searcher. The mountain pueblos are generally poor in shell, probably because they were off the routes of primitive commerce, or they may have had little to trade. Pueblos in passes through the mountains, as at Chaves Pass, must have been more in touch with aboriginal commerce, and in this case abundance of shell was found.

Bone.—The people of Forestdale made great use of bone. The most numerous bone objects were awls of various sizes and descriptions, with points at either end, with an eye like a needle (Plate 13, fig. 4), or merely pointed splinters of bone. One specimen has a figure like the letter X engraved on the sides, as seen on the ceremonial ax found at Cheylon.^b This was the only instance of ornamentation on bone observed. Cups formed by sawing off elk femurs near the ends are common, as at Pottery Hill. It has been suggested that these cups are rejects after the shaft of the femur was cut up into rings. The absence of such rings from the collection, and the finish of the lip of the cups, would seem to offer an objection to this theory, but the use of the cups is unknown. Rings cut from femurs apparently for the finger have been found at Chaves Pass. Wedges of bone and antler, numerous knives of deer rib, hide scrapers worked from deer pelvis, bone tubes, a bone with holes drilled through it (thought to be an arrow wrench), an ornament of antler in form of a bear's claw, and bones used in flint working were collected. (Plate 13.) The lower jaw of a deer from this ruin, with bands of red painted diagonally across it, is an interesting object.

Fragments of decayed wood were taken from the excavations, but it was not possible to ascertain whether they were worked. No cord or fabric of any description was encountered.

A large number of bones of animals were collected from the débris,

^a J. Walter Fewkes, Report, Smithsonian Institution, 1897, pl. xvii.

^b Idem., 1896, pl. xlvii.

where they occurred in great numbers. These have been ascertained by Mr. F. A. Lucas to belong to the elk, deer, antelope, dog, gray fox, mountain lion, wild-cat, beaver, turkey, and eagle.

It is apparent from the number of bones of animals that the Forestdale tribe were to a great extent meat eaters, and hence must have been hunters. The dog and possibly the turkey were domesticated. It would be interesting to connect the meat diet of the Forestdale people with their achievements as builders, but such theories must be advanced with hesitation.

Unfortunately, during the course of this exploration very few skeletons were encountered, and in these cases the bones were extremely decayed, so that no crania could be secured. From the fragmentary bones thrown out by the vandals who sacked the east cemetery it is obvious that adequate somatological material could have been acquired here. This is another example of the destruction of valuable scientific evidence by careless and unskilled hands.

The pottery of Forestdale bears a closer relation to that of Pinedale, north of the Mogollon Divide, than to any other ancient pueblo known to the writer. The bright red ware with black on white decoration is also found in a number of ruins along the mountains from Chaves Pass to Pinedale, reaching to within 40 miles of the Little Colorado and associated at Chaves Pass and Four Mile with yellow ware. The gray vases are not duplicated north of the divide; they will be found to belong to the Salt River Valley in all probability. The practice of incinerating the dead separates the ruin from any yet examined in the Little Colorado drainage.

On the whole, the Forestdale ruin is only one of perhaps a number along the head streams of Salt River, which is on the natural migration line from the south by which the Indians led Coronado to Cibola. In the absence of information concerning the ruins it is not possible at present to make any approximate statement as to them. Forestdale may have been the stopping place of an important section of the southern element which tradition has it went to form the Zuñi or it may mark a southern extension of the Zuñi. The cremation of the dead also tallies with the Zuñi tradition that formerly they practiced the same custom.^a The burial against the house walls also reminds one of the Zuñi expression, "We bury our dead beneath the ladders."

The plans of the old Zuñi ruins figured by Mindeleff in the Eighth Annual Report of the Bureau of American Ethnology show that Nutria is a circular pueblo and that Pescado, so far as the ancient plan can be traced, approached a circular outline. Kintiel, which is a Zuñi ruin, and several of the ruins of the Canyon Butte group north of the Petrified Forest are of this type.

^aCushing. Zuñi Creation Myths, Thirteenth Annual Report of the Bureau of American Ethnology, p. 336.

Zuñi archeology still awaits an explorer who will do as much for it as has Fewkes for the Hopi. A vast and untouched field lies south of Zuñi, and complex migration problems cluster around the headwaters of the Gila, Salt, and Little Colorado rivers. In much of this region, on account of the work of untrained explorers and curio hunters, it is too late to do more than secure what they have left or to trace the material to private or museum collections for the purpose of study.

INTERIOR SAWMILL.

Leaving Forestdale a reconnaissance was made to Fort Apache, following the road south from Cooleys. A cave in a lava bed near Interior Sawmill was examined, but no evidence of occupation found. A short distance from the Interior Sawmill a small pueblo yielded on excavation a few pieces of gray ware, a large flaring bowl in fine coiling, a stone hammer (Plate 14, fig. 1), a bone tool splendidly engraved (Plate 14, fig. 2), and a skull. Farther south along White Mountain River a number of rectangular pueblos were seen, but no excavations made. From the surface relics these ruins appear to be poor and the pottery, gray, red, and coiled, of inferior quality. Having secured photographs and ethnological data from the Apaches and made botanical collections, the party returned north, excavating for half a day at Snowflake, where a small ruin yielded a few pieces of gray and red ware and a skeleton.

LINDEN.

Near Linden, Navajo County, Arizona, some 45 miles south of Holbrook, there is a large ruin, locally called Pottery Hill, lying on the north side of the watershed near the divide between the Salt and Little Colorado rivers. This part of the White Mountain Plateau presents a series of beautiful park-like expanses between low ridges, well grassed and studded with large pines and clumps of stunted oaks. At this elevation in the White Mountains the humidity is sufficient in favorable seasons to admit of dry farming. Stock raising and dairying is the main occupation of the people. The soil, formed by the decomposition of carboniferous sandstone, limestone, and shales is fairly rich. Vegetation is abundant; after the summer rains and the melting of the snow in spring myriads of flowers appear.

It will be seen that the environment would be favorable to the maintenance of the prehistoric people who lived here, furnishing wood for fuel and construction, useful plants, clay for the potter, and stone for the builder. Game abounded and wild bees yielded honey. In this locality, however, there are no springs, the water sinking and necessitating at present its impounding in ravines. A few wells have been dug at Linden, but the water is scanty and unpalatable.

The ruins (Plate 15) are situated on a ridge bounding the southern

side of one of these parks. The main site covers the lower end of the ridge lying with its longer axis north and south. On the east the ruin slopes down to the valley by a series of terraces and on the west to a shallow draw. Its outline is oval, measuring 228 feet in length by 150 feet in width. The cemeteries lie to the east and to the west of the pueblo and to the northwest is a shrine among the rocks, consisting of a pile of fossils and iron concretions of peculiar shapes.

Detached rectangular ruins occur at intervals in the juniper and pinyon woods at the northwest along the margin of the gradually ascending ridge extending perhaps 1,500 feet. Aged junipers grow in these ruins and the remaining building stones show extreme weathering. No trees except some young junipers grow on Pottery Hill, giving the impression that this ruin was occupied at a later period than the others in the vicinity.

Another interesting ruin of the Linden group, lying in the forest 2 miles west of Pottery Hill, shows a rectangular plan 45 by 72 feet, containing 12 rooms, and adjoining is a circular-house plan 65 feet in diameter, having a passage through the wall to the central court. (Plates 16 and 17.) There was little *débris*, and excavations were without results. Stumps of pine trees that had matured and decayed were found in place in the rooms. The plan of the ruin is instructive when compared with that of Forestdale, which also presents circular and rectangular features.

No walls are standing in the Pottery Hill ruin, and heaps of sandstone blocks from the houses, interspersed with fragments of pottery and broken implements, cover the surface. A reconstruction of the pueblo would show a long line of houses perhaps two stories in height, facing both ways, on the slopes of the hill, and below this successive rows of houses, forming terraces. To the east there were three or four terraces and to the west one or two. No detached houses or fire boxes were observed. Such walls as were uncovered during excavation were formed of oblong blocks of rough-faced sandstone laid with little skill. The *débris* of house refuse is enough to show lengthy occupation of the site.

The principal cemetery is in the *débris* on the west side of the pueblo some distance from the walls. Most of the graves had been rifled during the summer of 1900 by dealers in curios from Pinedale, but more systematic excavation brought to light a number of specimens. Owing to the strong nature of the soil few pieces of pottery were taken out unbroken.

A feature concerning the deposit of the dead in the graves at Linden such as the packing of stones and clay around the body, especially near the head, leads one to suppose that the device was to prevent burrowing animals from entering the sepultures. This mode of burial accounts for the destruction of the pottery when the earth sank and

packed in the graves. The burials were at length with no regard to the points of the compass, and no stakes were placed over the bodies as at Chaves Pass, nor were stone slabs found as in the ruins along the Little Colorado River. No traces of matting or other textiles were observed. The skeletons were mostly decayed beyond preservation. Bones of elk, deer, antelopes, turkey, and of small mammals and birds were numerous.

In the undisturbed cemetery to the east similar conditions obtained, but the majority of the specimens came from this point. A burial here was noteworthy in that two bodies were interred together, the skeleton of one is in fair condition, the other merely vertebrae, ribs, and scapulae. The place where the skull should have been found was covered with an inverted bowl containing ashes, and no fragments of the skull were present. As a rule the pottery was deposited near the head; when a number of pieces were found they were laid along the body. In one grave as many as 12 pieces had been buried. No pahos or fetishes were found in the graves.

The finds at Linden include some interesting specimens of pottery of several classes. Gray ware is represented here principally by gray vases with spherical body and tubular neck, having a curved handle from the rim to the body (Plate 18, figs. 1-3); cups with handles; bowls with close zigzag ornamentation covering the interior (Plate 19, fig. 1), and canteens of good form and ornamentation (Plate 18, fig. 4). The bowl of fine gray ware delicately coiled on the exterior, and with a well-designed fret pattern forming a band around the interior wall, is a remarkable and unique specimen (Plate 18, fig. 5), no rugose vessel of the gray ware having been hitherto described to the best of my knowledge.

Another noteworthy specimen is a gray bowl with interior ornamentation of human and animal figures, (Plate 19, fig. 2.) Around the side of the vessel a herd of deer run in single file below a grotesquely drawn human figure in attitude of surprise, and in the bottom of the bowl is drawn a large mountain lion. Apparently there is no symbolism involved in the design. The intention of the artist evidently was to portray in a realistic manner some actual occurrence, probably the encountering of a herd of deer pursued by a mountain lion. Fragments of pottery showing portions of composition have been picked up on ruins along the north slopes of the White and Mogollon mountains, indicating the use of such designs, but whole specimens are exceedingly rare. The bowl in question was in many fragments when found.

Some bowls of coarse red ware with interior geometric ornamentation were taken out at Linden. They resemble those of Showlow and other ruins yielding gray ware. One well-made bowl (Plate 20, fig. 2) has straight sides, and on the exterior is a stepped design with white

border. The interior is undecorated. The edge bears black dots, a feature often noted in the ware of the mountain ruins.

Small cooking pots of coiled ware and small coiled vases occur at Linden. Great quantities of fragments of large flaring bowls with polished black interior and rugose exterior bearing volutes and grecques in white lay around the skeletons. Often five or six of these large bowls were nested in a grave, and, as may be imagined, the sinking and packing of rocky soil upon them produced such havoc that it was not possible to save fragments enough to reconstruct a specimen of what was evidently beautiful ware. A small globose bowl of this type was preserved intact. (Plate 20, fig. 1.) Among the small pottery objects from Linden are reground disks and small dippers. Fragments of vases and bowls with birds and the widespread four bird convention and a fragment of gray ware in form of a mountain sheep's head were picked up. A red bowl with the two joined bird symbol on the interior must also be noticed.

Rude axes and hammers, a fragment of an arrow-smoother of Gila type, a chipped chert implement resembling a pick, a flint chisel chipped and ground, a pitted stone, pottery smoothers, arrowheads, and flint and obsidian knives comprise the collection of stone implements from Linden. Ornaments of stone were a few large beads, disks, and tablets of red stone. Two cylindrical sections of fibrous selenite of unknown use were found in a grave. The stones from the shrine were iron concretions in form of cups, spheres, and odd shapes resembling birds, etc., fragments of red jasper, and a mass of fossil coral (*Syringopora multattenuata*). This was the only fossil observed; on the hill above a vein of Carboniferous limestone made up of fossils was seen and a number of specimens were collected.

Shell is very scarce at Linden; the objects of this material taken out were fragments of bracelets of pectunculus and a spiral shell ornament, *Turitella tigrina*, from the Gulf of California.

Bone was more frequent, consisting of awls, leather-working tools, scrapers, flint-working tools, punches, and other implements of antler. A number of antlers were taken from the excavations. Cups of elk and deer femurs similar to those found at Forestdale occur at Linden.

No fragments or traces of fibers or textiles were encountered.

The collection of bones of animals turned up during the excavation is found by Mr. F. A. Lucas to include the following: Antelope, elk, dog, jack rabbit, and turkey. But one complete human skeleton could be saved, the bones in most of the interments being in fragmentary condition.

Linden presents points of similarity with the Huning ruin at Showlow, best characterized by the rugose ware with white decoration, a type to which attention was first called by Bandelier in 1883. The range of this type is not clearly defined as yet, but the explorations of

the season of 1901 give localities at McDonald's Canyon and the Petrified Forest (see pp. 305, 314). One specimen each from Four Mile and Cheylon are figured by Dr. Fewkes.^a It must be said, however, that the occurrence seems to be sporadic at the sites mentioned and that the locality of greatest prevalence so far as known is at Linden. There is no doubt that this ware belongs on the northern slope of the White Mountains.

SHOWLOW.

A large ruin on the ranch of Mr. Henry Huning, at Showlow, was worked by the Museum-Gates expedition for a few days beginning July 12. Mr. Huning informs the writer that the ruin was examined by Mr. A. F. Bandelier some years ago.^b The pueblo is located on a rock table a few feet above the level of Showlow Creek, which irrigates the wide and fertile valley forming part of the Huning ranch. The layer of *débris* is thin; hence the plan of this ruin is somewhat easy to make out. (Plate 21.) Much of the stone has been removed for buildings, and during this process a room at the south end of the pueblo was found to contain a large amount of charred corn, beans, etc. The cemetery was located on the east side in front of one of the piers; there were few interments, and only a small collection was secured.

The pottery is of red and gray, the latter presenting some rather good pieces, a dipper with rattle handle being noteworthy. The red ware is not fine and the decoration not well executed. Rugose bowls with volutes of white were frequent, though in fragmentary condition. Bone awls and a worked deer femur were found. Notched flints, a stone ax, an arrow smoother, scrapers, arrowheads of obsidian, and a large chipped flint leaf form comprised the relics in stone. A bit of the clay as rolled out by the potter in the process of coiling a vessel was taken from the *débris*.

The scarcity of potshards on the surface of this denuded ruin was remarked, and reminded one of the absence of such relics from the Zuñi ruins, where the shards have been picked up by the modern potters to be incorporated, after pulverization, with the clay for vessels. One perfect skeleton was secured. Bones of dog, two species of rabbits, turkey, and deer were collected.

The Huning ruin is a good example of the rectangular pueblo, showing considerable skill in laying out a village. The masonry exposed during the excavations is good; the material is of blocks of Carboniferous sandstone.

It seems probable that the pueblo was inhabited only for a short time. The artifacts resemble those excavated at Linden, some 8 miles to the northwest.

^a Report, Smithsonian Institution, 1897, pl. II; idem, 1896, pl. XLII.

^b Papers, Archaeological Institute of America, IV, Pt. 2, p. 393.

SHUMWAY.

Near the town of Shumway, 40 miles south of Holbrook, on the banks of Silver Creek, a ruin of some importance was hastily examined while the party was on the way north from Showlow. The ruin consists of a long house group, two rooms deep, and a parallel house group having a wing at right angles at one end, and between these groups is a plaza (Plate 22). The rear house mass forms a high mound of débris from the two stories of this part. The cemetery lies in a sand bank near the walls of the front row of the houses, facing the creek. The graves had been rifled the summer before by a "pottery digger," who sold his ill-gotten gains at Holbrook. It is presumed that the specimens are in a collection purchased at Holbrook in 1901 by the Free Museum of Science and Art of Philadelphia. A number of fragments, sufficient to show the quality and character of the pottery, were picked up on the excavations. The pottery is fine yellow and red, and the decoration is like that of the ancient Hopi pottery. The fragments show that symbolic designs were common on the interior of the bowls.

LITTLE COLORADO VALLEY.

MCDONALDS CANYON—SCORSE RANCH—CANYON BUTTE—ADAMANA—METATE—WOOD-RUFF—MILKY HOLLOW—STONE AXE—SMALL SITES NEAR STONE AXE.

MCDONALDS CANYON.

On the day of my arrival at Holbrook some Mexicans brought in 58 pieces of excellent pottery from ruins 22 miles southwest of that place, in McDonalds Canyon. (See general map.) It was ascertained that there were a number of ruins perhaps worthy of examination in the locality whence the specimens came. Hiring a small force of laborers and getting together a camping outfit, on May 4 we camped by the ruins, 11 miles from nearest water.

McDonalds Canyon is the name for quite a scope of country among the ascending Carboniferous ridges flanking the White Mountain Plateau. The dry wash leading into the Little Colorado, between Holbrook and St. Joseph, which heads back in the mountains, has numerous branches, so that the country is broken by canyons of no great depth, sometimes expanding into wide, level barrancas, becoming in wet seasons lakes. The ridges, deeply covered with yellow sand and clothed with junipers, present a most desolate aspect. The environment is hostile as to food and water, as the party experienced. In the seasons when rain falls, water is impounded in the natural tanks, but does not last long under the extreme evaporation at this altitude—5,400 feet. In one case a stone wall had been thrown across a canyon for the purpose of impounding water, a piece of engineering rare in this portion

of the Southwest, and at present the dam is effective, this source of water being the last to fail. Much of the present forlorn appearance of the country is caused by range stock.

The ruins, five in number, are located on sandy ridges from 1 to 2 miles apart. They exist as inconspicuous elevations and are very difficult to find amidst the maze of ridges. All the ruins of the group are rectangular in plan, the rows of houses surrounding a plaza the entrance to which is from the east. There were no detached houses. The largest ruin is typical of the group (Plate 23). It evidently had a two-story house of large dimensions at the northeast corner. Judging by the amount of *débris*, the other houses of the village were one story in height. A circle of stones lies to the southwest.

The house-building material is coarse yellow Carboniferous sandstone laid in gypsum, which is abundant in the formations of this region. Smooth floors of the same material and slab floors were observed in some of the rooms. Beneath the corner of the high house of Ruin 1 a number of small white quartz concretions had been placed, apparently in dedication of the structure.

The *débris* is sufficient to indicate the occupation of these villages for a somewhat extended period, perhaps two generations. Bones of antelope, deer, dog, wildcat, and rabbit were found in the *débris*.

The cemeteries lie to the northeast of the village, close to the walls, and contained numerous interments at a moderate depth, the bodies laid at full length, generally to face the east. The grave of a child containing several mortuary vessels was found under the floor of a house. No grave slabs were discovered, and the burials near the walls were poor in pottery. The character of the soil is such that no incrustation of mineral matter was deposited, so that the specimens came out in unusually good condition. Twenty-three crania and portions of skeletons were collected. Though these ruins had been sacked, I was able during part of three days to collect over 100 specimens, many of which had been left as unimportant by the workmen, who only seek the marketable pottery and trinkets.

By good fortune the Bureau of American Ethnology was able to purchase from H. H. Scorse the valuable pottery previously collected here and from two other localities north of Holbrook. Thanks to this these specimens now in the National Museum supplement those collected by the writer and will be described with them in the following pages.

Seventy per cent of the ware at McDonalds Canyon is black and white, the "gray ware" so widespread in the Pueblo region, and the remainder is of red and coiled ware. The gray pottery from McDonalds Canyon presents some of the finest specimens of this ware in existence. The bowls are large and perfect and the decoration forceful, showing the touch of a master hand. The largest bowl (Plate 24, fig. 2) has a

band of geometric pattern around the side leaving a circular field in the bottom. This pattern is made up of bird forms. The bowl is ovate in outline, 13 inches in diameter and $6\frac{1}{2}$ inches deep. The pigment has burnt to a soft dark brown. A second bowl (Plate 24, fig. 1), also ovate in outline, has a series of frets of derivative bird forms and lines of hour-glass figures which are also a conventionalized form of two birds placed feet together with heads in opposite direction. The design is arranged in four wedge-shaped areas leaving a square field in the bottom of the bowl. This bowl is 13 inches in longest diameter and $5\frac{3}{4}$ inches deep. Another bowl (Plate 25, fig. 2) of large size bears on the interior a bold and striking design of interlocking hooks arising from pyramidal bases. These are birds and the effect is to produce a running key pattern outlined in black. The design, like that of Plate 24, fig. 1, is in four wedge-shaped sections outlining a square field in the bottom of the vessel. The color used is a rich, glossy black; the specimen is fresh and in perfect condition (diameter, $11\frac{1}{2}$ inches; height, 6 inches). Still another large bowl (Plate 25, fig. 1) from this group of ruins belongs with similar specimens from the north. Almost identical pieces were found at Score Ranch (see p. 308), and W. H. Holmes figures one from Tusayan.^a It is more than probable that this splendid bowl was secured by barter from the people of lower Le Roux Wash. The arrangement of the design is like that of the last-described bowl and the outline is more symmetrical. Several other gray bowls show resourcefulness and manual skill in decoration that mark all the specimens from this locality. Gray vases of good form, with handles, are next in frequency after the bowls. These comprise the list of forms in gray ware. The vases are of different sizes from very small to those holding upward of a quart. The small vases are as carefully decorated as the larger and it is probable that they are connected with ceremonial usages as the little sacred water vases of the Hopi.

Attention may be called to a vase of excellent form and decoration. (Plate 26, fig. 2.) The design is made up of horizontal bands inclosing two running scrolls; the motive, birds with interlocking beaks. Four groups of four vertical lines are arranged on the rim, resembling the Pueblo rain symbol. The black pigment has a remarkable luster, unlike that of any specimen known to the writer. A vase, probably of idealized bird form, was taken from these ruins.^a (Plate 26, fig. 1.) The surface design in red-brown has become obscured by weathering, but enough remains to show that it represents feathers.

The red ware consists principally of small bowls and dippers of friable paste. The surface is polished and decorated with geometric designs. The small canteen (Plate 29, fig. 1) is a beautiful object from

^a Pottery of the Ancient Pueblos, Fourth Annual Report of the Bureau of American Ethnology, p. 323.

its elegant form, high polish, and varying shades of red, like a ripe apple. A small vase decorated with spirals in white (Plate 29, fig. 2) is also an attractive object. With the red ware may be classed bowls of rugose ware with polished black interior (Plates 27 and 28, figs. 1 and 2) and a geometrical decoration in white over the rough exterior. The design reminds one of those on basketry and, taken with the rugose surface, is suggestive of the origin of this type of ware. A number of rough cooking pots of coiled ware, usually rather small, are in the collection from these ruins.

The only bit of relief modeling noticed is a small fragment bearing a rudely formed human foot.

It was noticed that worked stone axes and hammers are absent from the McDonalds Canyon ruins, their place being filled by spalled quartzite boulders and cylindrical battering hammers of quartzite and jasper. One boulder of natural form has two finger holes pecked on opposite sides. Pottery polishing stones, chert arrowheads, and knives are somewhat common. Flat metates and manos were present.

A pectunculus shell carved in the shape of a frog and bearing evidence of having been once incrustated with mosaic was found. Such specimens are rare. Dr. Fewkes figures an incrustated shell frog from Chaves Pass^a and a plain carving from Cheylon.^b A few beads of shell or stone were collected at McDonalds Canyon.

Some awls and a wedge-shaped object comprise the worked bone secured in these ruins.

No remains of textile were observed. The house refuse shows bones of turkey and deer few in number. Charred corn was also taken out of the excavations.

Pahos and fetishes, except the stones found under a house corner, were not seen.

The crania nearly all show the flattening of the occiput so common in the Pueblo region. From the somatological series procured at McDonalds Canyon it will be possible to make a contribution to the affiliations of the inhabitants of these pueblos.

In September, after the close of the Museum-Gates expedition, the writer spent some time in examining and mapping two groups of undescribed ruins north of Holbrook on the Le Roux and Cottonwood washes at the Scorse Ranch and near Biddahoochee, respectively.

Le Roux Wash extends southwest from the Navajo Reserve, near the New Mexico line, about 100 miles to the Little Colorado at Holbrook, Arizona. There are two branches, one called Pueblo Colorado Wash, heading on the 8,000-foot contour near Zillh Tusayan Butte, and the other heading northeast of Old Fort Defiance. The valley is wide and sandy, and on account of the large drainage area the water from

^a Report, Smithsonian Institution, 1896, p. 529.

^b Idem, p. 535.

local storms in the basin is distributed for long distances; not infrequently the wash "runs through." Because of the water and of the fact that the bed of the wash offers numerous places where the water overflows wide areas of sand, forming ideal locations for Indian corn-fields, the movements of migrating clans have been along Le Roux and Cottonwood washes rather than along the Puerco and Upper Little Colorado with their swift current. The prevalence of ruins along the Le Roux Wash is in accordance with the conditions noted. The better-known ruins are those at Ganado, Kintiel, and Tanner Springs, and to these we may add the group under consideration.

Along this migration route the gray and red ware in northern forms of the San Juan have been carried south and west to the Little Colorado far into Tusayan. It is probable also that the migrations extended into the White Mountain plateau and are responsible for some of the sites furnishing gray and red ware, as at McDonalds Canyon. It must be said, however, that the characteristic San Juan forms thin out in the western part of the White Mountain region, while on the lower Le Roux they exist in entirety.

SCORSE RANCH.

The Scorse Ranch ruins lie on the south side of the Le Roux Wash, in the broken country along the north flanks of the Holbrook mesa, at a distance of from 16 to 20 miles north of Holbrook. (Plate 30.) They extend from the "X" Ranch to the Scorse Ranch, a distance of about 4 miles. Small sites are also found at the level of the valley, but it will be seen that the larger pueblos were hidden in the hills, where there is building material at hand. Small house ruins are found near the base of the X Ranch Butte. This strangely formed mass of black lava has nests of predatory birds on its summit, and the house sites may have some connection with eagle ownership or they may have been field houses. The bed of Le Roux Wash always contains water, which may be had by digging a few feet below the surface. Wood is scarce; a few cottonwoods growing along the wash and a small clump of junipers on the mesa form the only trees to be seen. Desert vegetation, such as "rabbit brush," *Bigelovia gracilescens*, *Atriplex argentea*, etc., is relatively abundant and furnishes fuel to those who camp there. Clay is plentiful, and stone exists near the top of the mesa, where deposits of Triassic fossils and petrified wood were seen, one pueblo having been built of the last-mentioned material.

The ruins are rectangular, displaying no characteristics of plan worthy of remark. No walls stand above the surface, and the condition of the sites gives one the impression that the pueblos have been abandoned a long time. In general the pueblos face the valley without uniformity as to orientation, nor do the cemeteries appear to have

been oriented, the burials being located around the villages wherever a suitable spot could be found.

The houses were constructed of small irregular blocks of Triassic sandstone laid up in the usual way and were probably in the main one story in height. Débris around the villages is abundant.

It is not possible to go into detail concerning the method of burial practiced in these ruins, as the cemeteries had been rifled. From observation of the excavations it was gathered that burial slabs were used, that the ground is full of charcoal and ashes, and that some of the skeletons were well preserved. My guide, who had worked the ruins, informed me that almost no shell, turquoise, or beads were present.

A portion of the specimens went to the Watron collection, purchased by the Field Columbian Museum of Chicago, and the subsequent collections were, on the writer's recommendation, purchased by the Bureau of Ethnology. On this interesting collection the description of the artifacts of the Le Roux Wash ruins is based.

The Scorse Ranch collection numbers 175 pieces of pottery. Of these 43 per cent are of gray ware, 20 per cent undecorated brown ware with polished black interior, 18 per cent coiled cooking pots and coiled vases, and 14 per cent of red ware. The remaining per cent consist of a few miscellaneous pieces not classified.

The forms of gray ware in order of prevalence are: Vases with handles (41); bowls (23); globose vases (7); canteens (5); bird-form vessels (4); cups and dippers, of which there is 1 each. The brown ware with polished interior is: In the form of bowls (26); dippers (5); cups (1); and vases (1). The red ware: Bowls (12); vases (5); jars (4); cups (1); globose vases (1). The coiled ware consists principally of cooking pots, and with this class are a number of small, finely coiled vases of ceremonial use. One fine bowl of red ware with rugose surface was found.

Gray ware.—The texture of the gray ware is coarse, and in some cases the paste is so dark that it has been necessary to cover the vessels with white slip. The surface is roughly finished, and the marks of the smoothing tools are easily seen. The color used in decoration is black.

The variety of forms in gray ware is in keeping with the abundance of this class. The handled vases show considerable diversity in shape, from a simple bottle form to the typical vase form with neck and shoulder. (Plate 31, figs. 1–6.) Some of the vases resemble rude pitchers. In size these vessels range from 2 to 10½ inches in height. The rounded bottoms and heavy handle at the neck render these vessels unstable like the ancient tumblers.

Another purely northern form is the globular bowl. (Plate 32, fig. 6.) These are usually in gray ware, but sometimes in plain red. The

first specimens of this form in the National Museum were collected by Dr. Edward Palmer from an ancient pueblo at St. George, Utah. They are always thin and well made. The vessels in form of canteens are also skillfully made and well decorated. (Plate 32, fig. 5.) They are small to be used for carrying water compared with the canteens in use at present. This form, which is of rather wide distribution, is found in the ruins of the gray and red type in the White Mountains, as well as on the Rio San Juan.

The bowls of gray ware range from crude specimens with flat bottom, straight flaring sides and simple decoration, to those displaying a degree of taste. One of the more interesting bowls has a remarkable design of unknown meaning. (Plate 34, fig. 2.) Another shallow bowl has a decoration representing a horned snake with two heads. (Plate 34, fig. 1.) The design on a third bowl consists of two bands of the bird pattern in waved lines. (Plate 33, fig. 1.) This pattern is found at McDonalds Canyon. (P. 304.) A bowl with precisely drawn decoration shows bird figures in an extreme stage of conventionalization. (Plate 33, fig. 2.) This bowl apparently has been intentionally bent into its present shape; other bowls so bent have been found in the White Mountain region. A small bowl from this location is the only one having decoration in brown pigment. The vessel is in good condition and resembles Zuñi work. Another bowl has a design in the center of the field in the bottom formed of crossed lines over concentric circles. This is the only vessel from these ruins bearing symbolism in this manner.

This collection has a number of bird forms in gray ware. (Plate 32.) One very good specimen (Plate 32, fig. 1) has a loop at the tail of the bird for the passage of a cord; the head of the bird is missing and with this portion the other loop. The arrangement of the decoration into several fields is a conventionalization of the bird topography. The small vase (Plate 32, fig. 4) is interesting as showing both bird form and surface decoration of bird elements. A small rude vase of bird form has a decoration of feathers around the neck. (Plate 31, fig. 3.) Another undecorated vase is closer to the bird form and bears wings in relief on the sides. (Plate 32, fig. 2.)

Of the brown ware with polished black interior there is little to say, except that the bowls are distinctly conical. This ware should be considered a variety of red.

The red ware consists mainly of soft earthenware bowls with polished surface and geometric line decoration on the interior. (Plate 35, fig. 1.) The bowls of harder paste have exterior decoration in white (Plate 35, figs. 2 and 3) like those of Canyon Butte (see Plate 47). So far as known at present, the distribution of this type of decoration is coincident with the range of tribes of Zuñi culture. Thus, specimens have appeared at Kintiel, Navaho Springs, Petrified Forest, Scorse

Ranch in northeastern Arizona, and in the St. Johns region extending south of Zuñi, New Mexico. Presumably the rugose vessels with kaolin decoration centralized at Showlow and Linden belong to a separate class more limited in distribution. A small red vase with finger sockets (Plate 36, fig. 1) is noteworthy as is a specimen ornamented with concentric marks made with the finger nail (Plate 36, fig. 3). The handled vases (Plate 36, figs. 4 and 5) in red resemble similar gray forms. One of these is covered with red slip over gray paste. Great taste was displayed in coiling. (Plate 36, fig. 2.)

Some stone hammers grooved for the reception of a handle and a few basalt axes of good form and elegant finish (Plate 37, figs. 1 and 2), are in the collection. The implements of chert are leaf-shape knives, arrowheads, and drills. There are mortars with pestles of coarse sandstone and lava. (Plate 37, fig. 3.) A well-worked stone ball and two tubular pipes of lava (Plate 52, figs. 1 and 2) were taken from these ruins. But one object of shell, a valve of a clam, is included in the collection.

The pottery from Le Roux Wash has a crude appearance, due to lack of finish and skill in decoration. Without doubt there was an attempt to execute forms of some complexity and difficulty, but the result is rarely praiseworthy.

CANYON BUTTE.

This group of four ruins lies close to the northern escarpment of the chief basin of the Petrified Forest, at the source of a wash flowing southwest and entering the Little Colorado at Woodruff (see map, Plate 38). The country is high and rolling, sloping west and south from the rim of the Puerco Valley, which stands about 2 miles north of the ruins. The ridges are of tinted Triassic marls covered with wind-drifted sand, and sometimes sandstone ledges bearing a few stunted junipers crop out.

On May 9, when camp was made on the ruins, the country was well grassed and numerous desert plants had sprung up after seasonable rains, but no water was to be had nearer than the well in the wash at the "Jim Camp," in the Petrified Forest, about $2\frac{1}{2}$ miles away. There are no springs in this region, the water sinking quickly and flowing in underground streams.

It is probable that the people inhabiting these pueblos in former times impounded water in tanks in the marl which underlies this region. Sagebrush is the only available firewood, the few junipers being inaccessible along the rocky mesa sides.

In great contrast with the basins of the Petrified Forest the neighborhood of the ruins shows few evidences of erosion; hence the pueblos have been little disturbed and appear as low, weed-grown mounds strewn

with fragments of pottery, house stones, and other débris. The location of the group was known by two or three cattlemen only who had ridden over the site, and to this fact is due the preservation of the remains from the vandals who have ransacked the ancient pueblos of the Southwest for a number of years without let or hindrance. The environment at present is quite hostile, and there is no evidence that there has been any great change in the climate for centuries. Clay and stone are abundant, but the scarcity of food animals and plants, firewood, etc., coupled with the lack of water, render it somewhat of a mystery why the people primarily located in this region. It is probable, however, that the juniper forest formerly spread more widely over this section where areas of it now exist, having escaped the great denudation in progress. It has also been thought that a progressive desiccation is taking place in the Southwest; no observational data is at hand to substantiate this theory, and the generalization perhaps arises from the cycles of dry and wet years that have been noted by settlers in the country.

All the Canyon Butte Wash ruins face the east, the houses at the back of the pueblos having been two or more stories in height. The plan of the ruin varies; one is semicircular, another is ovate, another is rectangular, with one rounded or stepped corner; the remaining one is rectangular. The materials are small slabs of Triassic sandstone laid in mud, and the masonry shows little skill in breaking joints and tying corners. The exterior walls are 10 inches thick; the walls between the rooms 7 inches thick; the floors of stone slabs; the rear wall was plain and perhaps without openings. The rooms average about 7 by 10 feet in floor area, a size rarely departed from in the Pueblo region:

The cemeteries are northeast of the village at a short distance from the house walls. The dead were laid to face the same point of compass and covered with slabs of sandstone placed slanting over the body at a depth of from 2 to 7 feet. Detached house sites, altars, fire boxes, etc., were observed near the ruins. The débris of house refuse is considerable in amount, and yields bones of the rabbit, dog, turkey, rodents, and antelope.

In detail, the results of investigations of the ruins are as follows:

Ruin No. 1 (Plate 39), the most important of the group, is semicircular in outline, two rooms deep, the mound standing high at the back, indicating a terrace story. In the center of the court, near the house walls, is a depression about 20 feet in diameter. There are also traces of constructions in the court, which slopes down to the opening. To the northeast, in a low elliptic mound of house refuse, is the cemetery. Near the southeast end of this mound is a flat circular area having a heap of concretions and stones of odd and suggestive shapes and colors. Some of the stones are worked cylinders and spheres. Numerous tubular pipes of lava were scattered among

the stones, and near the altar is a fire box lined with slabs and filled with calcined fragments of volcanic rock. Three small house sites are located to the east of this ruin. Near the southern house a single burial was discovered, containing four pieces of pottery, some shell beads, and a few turquoise pendants. Near the northern group of houses and at the south end of the main pueblo are fire boxes of the usual form.

The distribution of interments in the cemetery brings out the fact that the area at the end of the mound due northeast of the pueblo contained the remains of the well-to-do members of the tribe placed deep in the ground and surrounded with valuable things, while on the outskirts the poor were buried in shallow earth without slabs and with only a broken vessel or a fragment beside them, the part standing for the whole. An interment in the favored spot may be described as typical of a burial of the better class. After removing the surface soil, clean earth was encountered intentionally mixed with fragments of charcoal. This earth was quite dry and solid and, had not charcoal been present, might have seemed unfavorable. At 6 feet upright stone slabs were encountered, and these being disengaged and lifted out were found to cover a rectangular cist, at 7 feet, cut out in the side wall of the excavation, and the marks of a wedge-pointed tool, probably a digging stick, were preserved in the hard white marl. The cist contained a skeleton at length, and with it were hundreds of small beads of calcite and olivella shells, a shell bracelet, a bone awl, fragments of pahas and matting, and nine pieces of pottery, some of them remarkably fine and unique as to decoration. (See Plates 48, 49.) Fragments of eagle eggshells were also taken from this grave. In another burial a rod of wood extended the whole length of the grave. The wood was decayed, but the object was evidently a bow. In the cemetery awls of bone, spherical hammers of chalcedony, arrow-shaft smoothers, and smoothing stones were encountered. Metates were few in number. The absence of worked stone axes and the scarcity of arrowheads was notable. Beads and ornaments of stone and shell, iron and copper paint were common. Corn, squash seed, fragments of matting, coiled basketry, and cord, the latter apparently of yucca fiber knotted, were secured from ruin No. 1. An interesting tablet of sandstone, having a rain-cloud design in black drawn across the face, was excavated from the cemetery. Such tablets are rare. (Plate 42, fig. 2.) The pipes or "cloud blowers," twelve in number, from the shrine are fine examples of stonework. (See Plate 52, figs. 7-9.) An awl made of hard, dark wood with carved head, from this cemetery, is unlike any other known to the writer. From a grave near the concretion shrine the skull of a dog was taken. The pottery, which was abundant in this ruin, will be considered with the finds from the whole group further on, as will also the osteological remains.

Ruin No. 2.—Two hundred yards southwest of No. 1 is a small rectangular ruin (Plate 40) facing a little south of east, the mound higher on the west. The stone is gray Triassic sandstone, brought from buttes 2 miles distant, and the masonry is similar to that of No. 1. The cemetery is on the east side and is small. A few graves exist on the bank of the wash to the west. The graves are deep, the ground rocky, and little pottery was placed with the dead. The ware is identical with that from other ruins of this group. A necklace of graded pectunculus shells with carved pendants was taken out. Chalcedony hammers, smoothing stones, a small mortar of red granite, and grinding stones were picked up on the surface. A fire box was located in the corner of the rectangular court. Seventy-five feet from the ruin is an altar located on a sand ridge. It consists of two bowlders set together near a section of fossil wood, *Auricaryoxylon arizonicum* Knowlton, brought from the neighboring forest. One bowlder is of red granite, 16 inches in diameter, and the other a spherule of dark sandstone, 9 inches in diameter."

Ruin No. 3.—Second in importance and in some ways more interesting than the others of the group is ruin No. 3, located on a rocky escarpment above a basin several hundred feet deep, excavated in the red marl. The ruin occupies a prominent position on a level rock platform, and the mound is better defined and stands higher than that of the other villages. A few junipers grow on the edge of the cliff, and on the mesa may be seen the *Cowania*, *Lycium*, and other plants familiar around the mesas of Tusayan. The ruin is oval in general outline, the north end approaches a half circle, the west side is straight, the south end is rounded, while the west wall runs in a northeasterly direction (Plate 41). The highest point is about 12 feet at the center of the mound, and another elevation at the north end of the mound is 7 feet above the base. These elevations mark the location of the highest rooms of the pueblo when it was in repair. From the shape of the ruins it appears that the village was pyramidal, the cross section at the highest point showing nine rooms. On the northwest a portion of the walls seems to have fallen *en masse* and lies buried in the ground giving the appearance of a pavement. At several points the walls may be traced. No detached houses or shrines were observed. The rocks below the edge of the mesa were examined for pictographs without success. If such existed formerly they were weathered out.

The cemetery lies to the northeast of the pueblo, where the soil composed of house refuse is thick. The burials were under sandstone slabs, as in the other cemeteries. It must be mentioned that occasional slabs were encountered in these ruins having circular holes several inches in diameter cut through them. A remarkable discovery was made in the cemetery of this ruin. In the midst of the burials

"See Harper's New Monthly Magazine, March, 1902, p. 899.

the workmen came upon a mass of broken human bones, which proved to be the remains of three individuals. Some of the bones bore traces of fire, and there was no evidence that with them had been interred any organic material; moreover, marks of the implement with which the bones had been fractured were discernible. Undoubtedly here was evidence of cannibalism, but as the find is unique so far in this region it probably only indicates anthropophagy from necessity. Ceremonial cannibalism among the North American Indians was not unknown, however, as references in the early writers bear witness.

Near this ossuary was unearthed the skeleton of a priest, and with him a remarkable collection of the implements of his profession, consisting of polished translucent conoids and plates of worked chalcedony, cylinders of hematite, tablets of lignite, fossils, crystals, concretions, minerals, paints, bone plates and tubes, awls, a flint knife, a small paint pestle, the remains of a bow, etc. (Plate 43.)

This find is important, as it shows a class of articles connected with the cult of the Zuñi Indians. ^a

Ruin No. 4 is located on a sand ridge between Nos. 1 and 3. It is rectangular in plan with a cross wall dividing it into two courts, and in the center of each court there is a depression. The south end of the ruin is stepped, giving this part a rounded outline. (Plate 44.) A corner room 10 feet square was cleared out and the walls exposed, showing masonry of inferior character. The west side of the mound is high, a feature noted in other ruins of this group. To the north and southeast are small house plans. Excavation in the cemetery to the east-northeast of the pueblo brought to light no features of difference from the other pueblos. A small number of pieces of pottery, worked stones, beads, etc., and some skeletons were taken out.

1. Artifacts—Pottery.—Red ware preponderates in the Canyon Butte ruins and gray rarely occurs, only seven pieces all told coming out, so that the group must be classified with those furnishing red ware exclusively. To this class belong the other ruins on the Petrified Forest Reserve, the neighboring ruins at Adamana, and the Milky Hollow, with the exception of Stone Axe and Metate sites.

For convenience of treatment the red ware may be divided into three kinds, namely, (1) rugose, (2) plain, polished, and (3) decorated. The rugose ware comprises coiled vessels, on the exterior of which the coiling has a decorative treatment;^b that is, (*a*) modeled as a smooth, salient ridge forming a spiral from the base to the rim of the vessel (Plate 45, fig 2); (*b*) the coiling worked in such a way as to divert the attention from the horizontal coiling lines, giving a pleasing rough effect like basketry (Plate 45, fig, 1), and in some cases the

^aSee F. H. Cushing, Zuñi Fetiches, Second Annual Report of the Bureau of American Ethnology.

^bW. H. Holmes, Ornament in Ceramic Art, Fourth Annual Report of the Bureau of American Ethnology.

surface so treated has been polished without obliterating the crests and troughs of the waves (Plate 45, fig. 3); (*c*) the coils flattened down into a narrow ribbon, each coil imbricating its neighbor below, and (*d*) fine and regular coiling, with slight indentations on the coil ridge (Plate 45, fig. 4). The rugose ware is frequently decorated on the exterior over the rough surface with volutes and interlocking frets in white pigment. The specimen figured on Plate 46, fig. 3, is the finest example of its kind, a type hitherto undescribed. The exterior is red and the interior lustrous black like that of the Santa Clara ware. The rugose and plain bowls have all polished black interior, with the exception of one specimen (Plate 46, fig. 1), of which the interior is polished red bearing geometric decoration in black. Coarse black cooking pots, so common from ruins in the Pueblo region, are almost wanting in the Canyon Butte ruins.

2. *Plain ware*.—This ware, entirely in the form of bowls, offers little variety. The interior of the vessels is black and the exterior red, the surface showing the application of the polishing stone. These bowls are numerous and are from medium to small size. One small bowl is decorated on the exterior with three horizontal lines. A number of like bowls have a small pit in the center of the bottom, and it is surmised that these holes were to socket the lower end of a spindle. Such bowls are used in Mexico at present for this purpose.^a

3. *Decorated*.—A striking series of bright red bowls was secured in these ruins. These bowls are very large, are decorated on the exterior rim with frets in white (see Plates 46 and 47) and on the interior with geometric patterns, with which are incorporated conventional symbols. The stepped rain cloud forms the burden of the designs, involving rain, hail, birds, stars, etc., and perhaps corn, the two latter occupying panels surrounded by the geometric designs. One bowl shows an interesting pattern, in which the artist seems to have broken away from the traditions and produced a design of exceptional character (Plate 47, fig. 2). Two unique and beautiful bowls from a cist burial in ruin 1 merit especial attention (Plates 48 and 49). The exterior is yellow, on which an ingenious meander pattern in red is traced; the interior is of a deep, rich red, having a repeating fret pattern inclosed with bands of narrow horizontal lines, cross-hatched at intervals, painted in black on the surface; the bottom as in the other bowls left plain. The smaller bowl has the conventional symbol of four birds on the angles of a square.

A few pieces of red ware with white slipped interior, on which the design is painted in black occur here (Plate 61, fig. 2). Some have white rim decoration and in others the rim is plain. These pieces are of the Gila type described from Stone Axe ruin, and are perhaps imitations of the Gila ware.

^aJ. N. Rose, Contributions from the U. S. National Herbarium, V, 1899, p. 251.

The paste of the finer red ware is of selected clay firing to a brownish yellow color. This was covered with a thick slip of red; the natural color of the paste is seen on the exterior of the bowls figured in Plate 48. The paste of the rugose vessels and plain red bowls is coarse, firing to dark gray on fractured edges. Most of the bowls are slipped with red, as not many clays give a good body color. The paste shows no admixture of pulverized fragments of pottery as does that of Zuñi, nothing more appearing than small pebbles, etc., which were impurities in the clay.

4. *Gray ware*.—From a cist grave in ruin 1 is a large deep gray bowl with striking ornamentation on the interior (Plate 50, fig. 2). The ornamentation and deep form of this bowl are unusual, the hatching of the design is like Zuñi. There is no exterior decoration. The paste is granular with small quartz pebbles. The vessel has been slipped with kaolin, and this process has been carried out on the other vessels for the reason that a better finish and whiter ware may be secured by clay levigated of coarse particles in water, forming slip or wash. Another gray bowl of thin ware with paste similar to the one just described is an excellent example of the highest skill of the potter (Plate 50, fig. 1). The pattern is a fret formed of small trapezoids produced by crossing diagonally accurately drawn lines, giving the effect of mosaic. On the field in the bottom of the bowl is painted with great skill a frog. The frog is a symbol of water and its symbolic use is widely diffused in the Pueblo region, carved in shell, formed in clay, worked in turquoise mosaic or painted on pottery. The treatment of the frog on this bowl is similar to that on the ware of the Navajo Springs region, of which an example was collected at Kintiel, an ancient Zuñi ruin 32 miles north of Navaho Springs, in 1896, by Dr. J. Walter Fewkes and the writer.

Mention should be made of a bowl with handle, a large dipper with rattle handle having a swastika on the interior of the bowl surrounded with a wedge design and a small oblong vessel with square orifice, at the four angles of which holes are drilled for the cords, terminating in feathers, which are tied to certain ceremonial vessels of the Zuñi and Hopi.^a

The presence in modern pueblos of articles of pottery, basketry, etc., a long distance from their place of origin is often noted and is due to the primitive commerce that has been carried on from time immemorial among the pueblo tribes. Necessarily from the perishable nature of many of the articles of trade, excavations in the ruins do not often yield instances of interchange. An interesting example was, however, secured in the Canyon Butte ruins in shape of a handled vase of gray ware with white decoration in brown on the body and

^aJ. Walter Fewkes, *Journal of American Archaeology and Ethnology*, IV, p. 43, Boston, 1894.

bird tracks around the neck (Plate 51, fig. 1). On bringing the vase to Washington and comparing it with a specimen in the National Museum from St. Johns (Plate 51, fig. 2), the pieces are found to be similar in every respect, so that it could be affirmed that the same potter made them and that subsequently they are separated 60 miles. A modern vessel from Zuñi (Plate 51, fig. 3), shows relationship to the vases described.

The skeletons in the cemeteries of the Canyon Butte ruins were found to be in a poor state of preservation, so that only a few crania and skeletons could be secured. From a cursory examination of the bones it would seem that the people differed little, if any, from the brachycephalic, short-statured inhabitants of the Pueblo region. The material will be studied by an expert and the results presented in a monograph.

About $2\frac{1}{2}$ miles north of the Canyon Butte group, near a high point on the rim of the Puerco, was found a stone box set in the ground filled with a cement of puddled earth, mixed with charcoal and ashes, enveloping the bones of young turkeys. This seems to be a shrine, and is the only one of the kind known to the writer, and may afford a clew to the purpose of some of the similar isolated boxes which are of frequent occurrence in the pueblo region. These, however, may be eagle shrines near the nesting places of the birds of prey, so important in Pueblo cults, which are visited at present by the Hopi, the clans laying claim to the eagles of the localities where they settled during their migrations.^a A shrine of this character was discovered at Biddahoochee by the writer in 1901. The offerings were water in a ceremonial vase, food, and prayer sticks placed under a shelving rock near a lava-capped butte. The eagles of this locality are claimed by the Lizard clan. While the turkey is a venerated bird, it does not have the high rank accorded to the eagle. The obvious arrangement of the shrine on the Puerco rim may have had to do with a desire or prayer for the increase of turkeys.

The people of this group had the dog, but judging by the bones picked from the excavations their game animals were the deer, turkey, and rabbit.

The ancient pipe of the Pueblos is tubular,^b worked of pottery or stone, the favorite material being vesicular lava. Pipes of lava are abundant in the triangle between the Puerco and Little Colorado rivers, just within the boundary of the range of clans of Zuñi culture, and from their abundance this seems to be the type region. Tubular pottery pipes, and occasionally one of stone, occur sparingly in the

^a See the interesting paper by J. Walter Fewkes, entitled Property Right in Eagles among the Hopi, *American Anthropologist* (N. S.), II, Oct.-Dec., 1900, p. 690.

^b See Pipes and Smoking Customs of the American Aborigines, J. D. McGuire, Annual Report, U. S. National Museum, 1897, p. 378.

ruins of Tusayan. Larger tubes of stone of similar forms to the pipes are supposed to have been used for blowing clouds of smoke on sacred meal and during the ceremonies to the cardinal points. This must have been attended with some difficulty in practice. The smaller pipes are undoubtedly designed for smoking. In many of those from the Petrified Forest region a definite bowl has been worked out (Plate 52, fig. 8); a number show an hour-glass section, caused by boring from either end, and in some the tube is smoothly bored. Forms of these pipes are shown in Plate 52, figs. 7, 8, and 9; figs. 1 and 2 are from Scorse Ranch. An interesting specimen from the Milky Wash ruin shows the application of a bone stem to a small lava pipe bowl (Plate 52, fig. 3). The stem fits snugly against a septum of baked clay inside the bore, and forms the bottom of the bowl, which has been cut out as in fig. 8. Attention is particularly called to this feature, as the use of a stem with the ancient stone tubular pipe has not before been noted.

Another specimen of unique form is from the Metate ruin (Plate 52, fig. 6). The material is of the fine-grained reddish sandstone of the region. The lower end of the pipe has been worked out as a stem or for the securing of a wooden stem, as in the pipes of the Hupa Indians of California.

The Tusayan pottery pipes, from their material, offer much more latitude in construction and ornament than those of lava, the latter sometimes showing a pit-shape depression or a row of such pits as decoration. In general these pipes are fusiform, with bowl worked out in the end and a central bore opened through the tube with a slender stick while the clay is green. Frequently these pipes are decorated with dark-brown color. Occasionally the tube is bent slightly. The specimen (Plate 52, fig. 5) is of pottery, extremely well made, and polished, the color dark brown. It was found at Awatobi in a vase with a number of similar specimens, and was presented by Mr. Julius Wetzler, of Holbrook, Arizona. The squared stem and globular bowl mark a greater differentiation than is observed in the more ancient tubular forms. The pipes of clay and stone used by the Hopi in their ceremonies at present show a variety of forms from the simple tube to shapes approximating the European pipe. Many of these pipes are curved or bent to as great an angle as would be consistent with punching the orifice through from both ends, and often they are modeled in the shape of animals. No pipes showing this degree of elaboration are found in the ancient pueblo ruins.

ADAMANA.

Near Adamana Station, on the Santa Fé Railroad, is a large stone ruin 150 feet square, two rooms deep, surrounding an open court having a single gateway to the north. The scanty débris and the almost

entire absence of pottery fragments indicate a short occupation of this pueblo. On the rocks under the mesa near by, however, is one of the most remarkable galleries of petroglyphs that it has been my good fortune to see. The designs are mostly of animals, a bird with long bill occurring frequently. No familiar symbols were noted.

METATE.

Across the wash from the Petrified Bridge is a ruin covering the apex and extending about halfway down the flanks of a conical hill. The houses were rectangular and were built of lava blocks. The hill bristles with oval inclosures and lines formed by setting on edge large slabs of stone, principally those worked out as metates, and from the number of these objects the site was given its name. The ruin is badly washed and blown out, and it was not thought profitable to work it, but a careful examination was made, a little excavation prosecuted, and a number of specimens gathered from the surface *débris*. The pottery is of coarse texture and undecorated except by lines scratched in the paste or by indentation in the coil, the colors gray-brown and black. The former inhabitants were workers in stone, as is evidenced by the profusion of such relics in the great accumulations of *débris* and the numerous metates and stone battering hammers. Several axes, a digging stone of chert, and the half of a tubular pipe of curious form were picked up. The metate people were in touch with primitive commerce, as fragments of wristlets cut from seashell manifest.

It must be acknowledged that Metate ruin is an archaeological enigma in the light of present knowledge. It is possible, however, that a survey of the ruins in the Navaho Springs region, where pottery with scratched ornamentation occurs, would clear up the matter. On weathered sandstone rocks near Metate ruin faint petroglyphs may be traced.

Three small ruins on the bluff above Metate ruin belong, from the character of the pottery fragments, with the Canyon Butte ruins north of the forest.

WOODRUFF.

The pyramidal lava-covered mass called Woodruff or Canyon Butte, the Mesa Prieta of the Mexicans, a prominent landmark over a wide region in northeastern Arizona, has on its southern terrace a remarkable series of circular remains. These circular platforms are from 50 to 75 feet in diameter, bordered with lava blocks. The platforms are level and smooth and have no traces of constructions upon them. Seventy circles were counted beginning about halfway down the butte and stretching both as connected and disconnected terraces to the edge of the bluff above the Lee farm house. Near the northeast end of the

terrace, judging from débris there, appear to have been habitations, but no walls could be distinguished. Building stones consisting of blocks of basalt are abundant. It is likely that the stone for the long wall built by Mr. Lee to inclose his goat range may have been in part taken from ruins. Pottery fragments are very scarce and those found are of the coarsest description of red and yellow brown, the latter with paste containing small pebbles resembling that of cooking vessels from Tanner Springs, on Le Roux Wash (see Map, Plate 1). A few hammers of fossil wood were seen. It is said that the numerous visitors to the butte are responsible for the paucity of surface relics, which is no doubt true. The conclusions as to the pottery, however, were drawn from an undisturbed section at the foot of the butte in the house yard of Mr. Lee where several skeletons had been found.

On the summit of Canyon Butte are remains of stone houses, the point affording an extended and agreeable view, especially over the alfalfa fields of Woodruff. The small birds carved from dark-blue steatite, figured by Dr. Walter Fewkes,^a were found on Woodruff Butte.

Speaking in the light of a superficial examination of these ruins, it seems that they are to be classed with the garden plots so common around ruins in the Southwest, and of which the gardens at Zuñi and Walpi are familiar modern examples. It must be said, however, that the labor expended in grading and terracing on Woodruff Butte has been enormous for what at present seems a futile effort.^b

MILKY HOLLOW.

To the east of the Petrified Forest, about 9 miles, is a ruin located on the edge of Milky Hollow and extending in a narrow strip along the edge about three-quarters of a mile (Plate 53). The village is being swept down into the Bad Lands and much of it has disappeared, including the cemeteries. The houses were small and rudely built, stone being very scarce. Pottery fragments are scanty, the ware coarse and undecorated, red, gray, and black in color. Stone implements, however, exhibiting excellent workmanship, are abundant, such as metates, small, neatly-finished mortars of granite, limestone, and quartzite; stone cups, scrapers, drills, stone balls, and a hoe of petrified wood among the rest. Some shell ornaments were found and two small lava pipes with bone stems or mouthpieces (Plate 52, fig. 3). These pipes and mouthpieces were found in place on the west side of the ruin, the stems with the bowls, but not fitted in them. On adjusting the stem it was found to fit accurately against a ridge of burnt

^a Report, Smithsonian Institution, 1897, p. 605, pl. III.

^b There is a tradition that when the Mormon colonists of Woodruff were putting in their first dam the remains of a former dam in the Little Colorado came to light.

clay around the interior of the bowl. The pipe thus resembles in form the tubular pipes of the Hupa Indians of California.^a

Strangely enough, the ancients of Milky Hollow possessed stoves, a number of which were seen near the house groups. They consist of two slabs of stone set up parallel in the ground about 8 inches apart, and across one end at right angles was a movable slab having a round hole 3 to 4 inches in diameter cut through it. No cover stone was seen in place, but such slab usually lay close by. The slabs were reddened and smoked by the action of the fire. It is evident that the perforated slab was an arrangement for regulating the draft, an essential matter in open-air fires in this windy region, where on many days the camper has to dig a pit for his fire and throw up a mound of earth to the leeward in order to reduce the difficulties of cooking. The position of the stoves near the houses and their number indicate that they were for domestic purposes, either for cooking wafer bread, in the manner of the Hopi and Zuñi, or as a primitive andiron on which the pots could be conveniently set. Mrs. M. C. Stevenson informs me that the Zuñi have a similar device, which may be termed a fire altar.

It does not seem possible to classify the people of Milky Wash ruin from the data at hand. It may be affirmed, however, that they were a people of low state of culture, not related to the tribes occupying the known pueblos of this region, unless it be the Metate ruin.

STONE AXE.

This ruin, so named from the number of actinolite axes found on the surface by cowboys, lies $4\frac{1}{2}$ miles east of the Central Petrified Forest, on the north slope, near the divide between the Puerco and Little Colorado rivers, 30 miles east of Holbrook (see Map, Plate 38). The road from Adamana to Cart's Tank and the Long H Ranch passes near the ruin, and the Black Knoll, a landscape feature of the region, stands a few miles from it to the north. The Milky Hollow ruin lies $4\frac{1}{2}$ miles to the east, and the Metate ruin, opposite the Petrified Bridge, an equal distance to the west. The country is high, rolling prairie, draining into washes leading to the Puerco. The elevations are sand ridges or low hills showing outcrop of Triassic fossils. There are no springs, permanent water being found only below the bed of the wash, near the Petrified Bridge. After a rain storm, water stands for a time in natural mud-lined reservoirs in the draws. The region of the Stone Axe is treeless, and there is little animal life. As there is no building stone, the ruin presents only mounds of ill-defined outline on the point of a ridge between two small washes. A survey of the ground shows four rectangular mounds facing

^a O. T. Mason, The Ray Collection, Report, Smithsonian Institution, 1886, pl. xvi.

north, grouped around three sides of a plaza (Plate 54). Some distance to the south on the sand ridge are evidences of detached houses. About $2\frac{1}{2}$ miles to the southwest, on the neighboring ridge, are three small village sites where artifacts are different from those in Stone Axe ruin. The winds have full sweep and power. The loose character of the soil renders it easily displaced by the infrequent and often torrential rains, and by these agencies many of the ancient pueblos of this locality have been almost swept away. In some cases the obliteration has been thorough. Near Stone Axe large tanks with hardpan bottoms, seemingly excavated by human agency, were found to be a result of wind action. It appears that wind erosion is equal to the erosion by water in this region. Much of the surface of the former mound of Stone Axe has been swept away, but enough remains to render it probable that the houses were formed by sinking a square hole in the ground to the depth of 3 to 4 feet and throwing the earth up around it to make low walls. The roof covering was probably a thatch of brush and grass. The roof in this region was required more for protection from the sun's rays than from the storm. The detached houses to the south of the pueblo show no ground plans. Their location was indicated by the presence of large coiled jars, ornamented vases, and pottery fragments exposed by the wind. These large jars had evidently been buried in the ground for storage of water as Castañeda relates of the Hopi.^a

Great quantities of potshards are scattered over the ruin and a number of stone hammers, metates, and hand stones lay about. Bits of copper paint stone, obsidian, flint, shell, and an occasional arrow point rewarded the search. The pottery fragments on the surface show ware of better quality and decoration, on the whole, than that excavated in the cemeteries, but not different in character.

The cemeteries, three in number, are on the glaciis directly in front of the main division of the ruin (see plan, Plate 54). A few sporadic burials exist on the east side. The burials were at length, with heads usually to the west, at a depth from 2 to 5 feet, in soil mainly of house refuse, and the skeletons were in rather good condition. From 150 to 200 burials, it is estimated, were made around this pueblo.

It was customary here to place food bowls, vases, cups, and other articles of pottery in the grave near the head. Many of the graves contained no mortuary objects whatever, which is unusual. Shell beads, ornaments of shell, awls, and tubes of bone, arrow-smoothing stones, scrapers and knives of obsidian and chert, red, green, yellow, and black paint were commonly found, also fragments of mats, coiled basketry, and pahos. Clinging to one skull was a fragment of a mosaic earring, formed of oblong, rectangular plates of turquoise set

^a Fourteenth Annual Report of the Bureau of American Ethnology, p. 490.

on a tablet of wood; beyond this, very little turquoise came to light. The collection secured here was small, though varied. Of stone, there are axes of actinolite (Plate 55, fig. 8), a material prized by the ancient Hopi and Zuñi; spherical battering hammers of fossil wood; rubbing stones like those from California (Plate 55, fig. 10); arrow smoothers of lava (Plate 55, fig. 9) and limestone (Plate 55, fig. 7); cylinders, disks, and spheres of sandstone (Plate 55, figs. 4, 5, and 6), probably used in games; drills, arrowheads, and knives of chalcedony and obsidian (Plate 55, figs. 1, 2, and 3); and tubular pipes of lava. Of shell there are gorgets of different shape cut from large shells or formed by merely polishing and perforating a sea shell (Plate 56, figs. 1, 2, 3, 5, and 6); a few olivella beads and small beads of cylindrical form. Of bone, there are awls, knives, tubes, and notably a whistle and a notched scapula, the former of eagle wing bone (Plate 56, fig. 2) with a hole cut through the wall near the middle where a small lump of pitch was inserted into the canal to produce a sound as in the whistles of the Kiowas and other plains' tribes, and found also among the present Hopi. The notched scapula (Plate 56, fig. 11) is from the deer. The instrument is still in use for ceremonial music among various existing pueblos and tribes of northern Mexico, and is played by laying it across a gourd or jar and scraping the notches with a stick.^a

Some obsidian was found at Stone Axe, but no arrowheads or implements of this material were seen. Vesicular lava was worked into spheres, cylinders, and pipes. Fossil wood and limestone were employed for hammers, scrapers, axes, arrowheads, etc. In this connection should be noticed a fragment of a limestone axe having scores on the side, which brings to mind similar specimens from Biddahoochee and Cheylon. Metates and hand stones were numerous and well worked out, the material being red and gray freestone.

Green, red, yellow, and dark brown paint stones, the latter of specular iron ore used by the Hopi in ceremonies, were collected.

Remains of textiles were seen. Fragments of palios were observed during the excavations, but they were not numerous.

The pottery of this ruin proves very interesting and gives the most important indication that the former inhabitants of Stone Axe were related to the Hopi. This fact is an important contribution to our knowledge of the migration of this people, as it was not anticipated that traces of them would be found in this region. This ruin is about 70 miles east of Homolobi, a group of Hopi ruins near Winslow, explored by Dr. Fewkes and the writer in 1896, and 50 miles southeast of the new group of Hopi ruins near Biddahoochee, which were discovered by the writer during the autumn of 1901. (See p. 326.)

The pottery presents greater variety than that of the ancient pueblos in the vicinity of the Hopi towns of Tusayan, which are characterized

^aThird Annual Report of the Bureau of American Ethnology, p. 394.

by yellow ware of unmixed paste. About half of the ware is of the type mentioned, varying in shades from cream to orange, the decoration in geometric and geometric-symbolical or symbolism verging on geometricism, the color brown, the forms bowls, vases, and dippers, the bowls having exterior rim decorations. (Plates 58 and 62.)

Among the minor articles of pottery collected are spiral relief ornaments which had been used in decoration (Plate 56, figs. 7 and 9); disks ground from pottery, often perforated as in spindle whorls (Plate 56, fig. 8); a rectangular fragment, on the edge of which teeth like a comb have been cut (Plate 56, fig. 11); a fragment of a globular rattle, perforated, of yellow ware; a dipper handle with rude attempt to represent an animal; scrapers; oblong tablets ground from polychrome ware in shape like the stone ornaments, etc. From the small ruins $2\frac{1}{2}$ miles to the west are disks, canteen lugs, etc. It was observed here that cup-shaped depressions were made in large vessels to aid the grasp. This feature is found in many ruins along the White Mountains, almost always associated with gray ware.

The collection shows a number of bowls of red ware of mixed paste, slipped on the interior with white, upon which are painted subgeometric designs in black; very few of these specimens have rim decorations. With this class are several polychrome vases, one quite large (Plate 57), the body of mixed paste burning light red. On this ground white is applied, outlining the portions of the design that are intended to be red. On the white areas portions of the design are painted black. In some instances the red areas are intensified with a wash of deeper red. The ware just described is of Gila type. Similar bowls have been found in the ruins north of the Petrified Forest, at Four-mile, Chaves Pass, Cheylon, and Homolobi,^a being prevalent in the ruins along the White and Mogollon plateaux, where the Gila influence is strong, and occurring sporadically along the Little Colorado and Puerco and to the north of these streams, except at Stone Axe, where the proportion is about that of Four Mile. The presence at Stone Axe of light red ware, characteristically decorated with narrow white lines breaking the field into irregular wedges, must be noted; also thin bowls of gray paste slipped all over with white and having sparse decoration in dark green or brown enamel. These types appear at Cheylon, Homolobi, and Biddahoochee, and W. H. Holmes informs me that the white ware occurs at Jemez, on the Rio Grande. The ware also has a vivid polychrome decoration of green, red, and white at Stone Axe; only fragments, however, were secured. (For remarks on distribution of pottery, see p. 354.)

The accompanying plates give a good idea of the color, form, and symbolism of the pottery from this important ruin. It will be seen that there is the same remarkable variety here that also characterizes

^aJ. W. Fewkes, Report, Smithsonian Institution, 1896.

the Homolobi, Biddahoochee, and many of the groups south of the Little Colorado, in contrast with the uniformity of the Northern groups, where gray ware abounds. This feature goes to show that the clans coming from the South passed through regions inhabited by tribes of different culture or arts and in the course of the migration incorporated some of these arts with their own. This is readily accomplished by clan marriage, since most of the arts, notably pottery and basketry, are in the possession of the women and are therefore readily transferred from clan to clan, provided that conservatism does not fix and require artifacts of a particular class within the clan into which the woman may be received. Of course in an orderly procedure the woman does not go to live with her husband's clan, but the opposite; still at present it is known that there are exceptions to this rule. On the whole, the accessions by which arts are carried from one clan to another would be by families. Thus the pottery of Gila type, which is equal in amount here with that of the yellow or Tusayan type, might represent the artifacts of an element from the Upper Gila and the yellow that of the Asa clan, which migrated from the Rio Grande to Tusayan by way of Zuñi. While this is conjectural, the symbolism on the yellow ware resembles that of the Jettyto Valley ruins, and the yellow ware alone bears symbolism of this character.

Typical specimens of this class of pottery are shown in Plates 58 and 59, while brownish yellow, also of this class, is shown on Plate 60. The color of the decoration is dark brown, and only in the case of the bowl with symbolism (Plate 60, fig. 2) is red used in connection with the brown.

Several vases of an ancient Hopi form were collected. The specimen figured (Plate 58, fig. 2) has a decoration in red-brown around the body. A bowl of fine yellow (Plate 58, fig. 1) is rudely decorated, having irregular patches of pigment applied with no system on the interior; it has an exterior rim decoration of unknown meaning. The bowl (Plate 59, fig. 1) bears a geometric decoration involving a number of bird forms; in the center is the familiar symbol of two birds with interlocking beaks adapted to a square figure. Another bowl of fine texture (Plate 59, fig. 2) bears on the interior a symbolic design surrounded with the "life line." The bowl (Plate 60, fig. 1) is decorated with a conventional bird, and the second figure on this plate bears a symbolic design representing a supernatural being in the style of the Katchina figures of the Hopi.

The ware with wash of white and decoration in enamel (Plate 61, fig. 1) bears a decoration on the interior of three interlocking hook forms which seemingly represent tails of snakes. A set of two zigzag lines extend around the exterior rim of the bowl; the space between these lines is often filled in with red. The second figure on this plate is a good example of the Gila type with geometric decoration. On the

edge of the rim are rows of small white marks, usually eight in each group; there is no decoration on the exterior. The specimen was up-turned when placed in the grave, hence it is well preserved. Moreover, it was perfectly new and unused when buried.

A bowl (Plate 62, fig. 1) of yellow-brown ware shows a fine arrangement of a complicated geometric design in which there are numerous bird forms. These may be traced in the square in the center and in wedge-shaped sections above and below. The rim decoration is a simple step design in an oblong frame.

The second figure (Plate 62, fig. 2) is a perfect specimen of a rare decoration. The ware is light red, and the design on the exterior and interior is in narrow white lines. The home of this style of ware is not known to the writer, but examples resembling it were found at Biddahoochee.

A small vase of good red ware (Plate 64, fig. 1) with handle, in the form of an animal looking into the vessel, a common conceit among the ancient pueblo potters, has a geometric decoration in hatched and solid areas in dark brown color. With this specimen was a bowl of fine yellow ware. (See Plate 58, fig. 1.) These specimens are not related. The vase should belong to the St. John-Zuñi region, while the yellow piece belongs to the special area in Tusayan.

SMALL SITES NEAR STONE AXE.

Another vase of gray ware with conventional animal handle (Plate 64, fig. 2) was found together with an elegant canteen, now in the Gates collection, in a small ruin some miles to the west of Stone Axe. This vase is covered with a well-executed geometric decoration, the motive being terrace figures in the dual hatched and solid color. A red bowl from the same group (Plate 63, fig. 1) shows the same treatment. The specimen is quite similar to bowls found at Forestdale, Showlow, Scorse Ranch, and Canyon Butte. It has no exterior decoration in common with those mentioned; a bowl from the small ruins near Stone Axe, without interior decoration, has horizontal bands of white on the exterior. (Plate 63, fig. 2.) The white exterior decoration is also common to the ruins mentioned above.

It will be seen that Stone Axe ruin presents a number of features of great interest to the student and some problems which may be solved when we come to know more of the ruined pueblos of the Southwest, multitudes of which await the explorer.

The group of small ruins 3 miles southwest of Stone Axe furnished hard gray ware, with black geometric decoration, soft red ware, and coiled ware with patterns formed by punching the coil ridges. These data affiliate the ruins with the numerous small pueblos scattered along the northern side of the White Mountains, apparently belonging to

the Upper Salt River or Zuñi type. The forms in gray ware, with geometric decoration in black, are canteens with pierced lugs, handled vases with tubular necks, large flaring bowls, and a small trilobed cup. The red ware was found only in form of bowls of incurved or slightly curved wall form, the decoration in black sometimes outlined with white. Numerous pottery and stone disks were found on the surface, and some shell ornaments, a spindle whorl, arrow smoother, etc., were picked up. Fragments of large coiled vessels with ornamentation formed by indenting the coil ridges were common here. None of these ruins showed above ten rooms.

Abundant somatological material was secured from Stone Axe, consisting of crania, skeletons, and parts of skeletons, numbering 30 entries. The skulls are brachycephalic and show in adults occipital flattening. The skulls of children do not present this feature. It is expected that this material will be described by a competent specialist when comparison may be had with the material collected by Dr. Fewkes and myself in 1896 and 1897 and reported on by Dr. Hrdlicka. Bones of animals brought up during excavation were carefully collected, no mammals larger than deer and antelope being noted. A portion of the skull of a dog was found.

As mentioned, the affiliations by arts of the Stone Axe people seem to be with the clans migrating from the south to Tusayan, which form an important element in the Hopi complex. The stations to the south in this case have not been located as yet. The next stopping place to the north, I believe, was Biddahoochee, and the route followed was by Carrizo Creek, which enters the Puerco a few miles west of Adamana, up this wash into the Le Roux Valley, and across into the valley of the Cottonwood, 8 miles southeast of Biddahoochee. (See map, Plate 1.)

The large stone ruin at Adamana, 9 miles northwest of Stone Axe, does not seem to have been occupied by this clan (see p. 317); neither does the small ruin a short distance north of the Puerco, near Adamana. The distance to the Biddahoochee group is about 25 to 30 miles by the route indicated, not too great for a single move, longer migrations having been noted in the pueblo region.

HOPI BUTTES AND MESAS.

BIDDAHOOCHEE—CHAKPAHU—KOKOPNYAMA—KAWAIOKUH—PERIODS OF TUSAYAN
WARE—AGE OF JETTYTO VALLEY RUINS.

BIDDAHOOCHEE.

For a number of years pottery has been coming into Holbrook from the north, and for the best of reasons the persons collecting pottery for gain were indefinite as to locations until the spoils had been gathered. The specimens brought in were usually mixed as to quality and

color of wares, due to careless methods of collection. The presence of fine yellow pottery of Hopi type in these mixed lots of gray, red, etc., led the writer to attempt to disentangle the problem in May, 1901, but sand storms prevented more than a glance at a few ruins on Le Roux Wash. In September, after the close of work with the Museum-Gates expedition, the thread was taken up again. The services of Juan Baca, the most assiduous "pottery digger" of this region of the Southwest, were secured, and an extensive reconnoissance was carried out, resulting in the mapping of the ruins to 40 miles north of Holbrook. (Plates 30 and 65.) Plans of the more important ruins were made (Plate 66), photographs taken, some pottery and pottery fragments and a few crania collected.

The Cottonwood Wash ruins are scattered about in an area of perhaps 30 square miles, mostly along the north side of the stream east and west of the crossing of the Holbrook-Keams Canyon road, at 7 miles south of Biddahoochee. (See sketch map, Plate 65.) From this crossing the Cottonwood runs southwest, entering the Little Colorado near Winslow. The upper portion of the stream is indefinite on the maps, and it is only possible to say that the wash parallels Le Roux Wash and has important branches from the north among the Moki Buttes on the 6,000-foot contour.

The first ruin examined lies on the level plain, 4 or 5 miles northeast of the buttes between which the Holbrook road passes. The location is at the head of a small, narrow canyon running north to the Cottonwood. The ruin is fairly large and is divided into two sections by the canyon; the part to the west is rectangular, and the eastern section is roughly circular. A seep spring, now dry, exists in the canyon below the ruins. The labors of coyotes and other animals digging for water were evident here. The numerous potshards are mostly of fine yellow ware; some fragments of thin red, with enamel decoration, and of white, with green enamel decoration, were seen.

Following down the canyon to the Cottonwood Wash and going west to the Navaho hogans, near where the Holbrook road crosses, a large ruin on the bluff was examined and sketched (Plate 66). The ruin consists of a quadrangle on the level at the top of the bluff and a prolongation conforming to a promontory bounded on the west by a deep ravine. From the number of human bones scattered about it is evident that the cemeteries had contained many burials. The pottery fragments are abundant and of fine quality like those of the ruins just described. On the same bluff, not far away, is a small ruin belonging to this group.

The Navahos in the valley have impounded the waters of the wash by means of a dam, thus securing enough water to last for several years. Several of the Indians told me that there is an ancient ruin on the summit of the large butte across the valley. Lack of time

rendered it impossible to verify this story. There is every reason to believe that a ruin crowns a low, block-shaped butte (Plate 67, fig. 1) some miles to the west of the ruins just described. At the base of this butte, near a Navaho corral, the cemetery has been excavated (Plate 67, fig. 2). The ware is yellow, red, and gray and not of the finer class.

Some few miles down the wash, on the southeast front of a large butte, are two ruins with a spring in a gulch between them. They also show ancient Hopi ware and were rifled several years ago.

The remaining member of this group is a small site containing six rooms, lying one-half mile south of the first butte on the Holbrook and Keams Canyon road.

As a result of the researches in this locality the writer was able to identify the specimens in the Scorse collection at Holbrook, procured by Juan Baca. In view of the interest attaching to the group of ancient Hopi pueblos examined for the first time, the purchase of these excellent museum specimens was recommended, and they were acquired by the Bureau of American Ethnology.

While the typical yellow ware characteristic of Tusayan makes up the bulk of the collection, there are several other kinds of ware that give the ruins additional interest as probably denoting the union of clans of differing culture. The yellow ware of Biddahoochee resembles that of Homolobi, collected by Dr. J. Walter Fewkes and the writer.^a It has fine, homogeneous paste, varying in shade from cream color to orange. One specimen (see Plate 72, fig. 2) is of bright lemon color. It is necessary to class the earth color and salmon color ware with the yellow. The decoration is in dark brown, red brown, and light brown. The designs are geometric, of great variety and boldness, as though not far removed from the original naturalistic concepts. Symbolism like that of the pottery found near Walpi is rare. Brief symbols are the arrow, feather, lightning, birds, corn, and the butterfly, a number of which will be noted in the plates of illustrations.

The forms of yellow ware are bowls, cups, vases, and dippers, the latter often with animal handles.

Four typical yellow bowls are shown on Plates 68 and 69. Plate 68, fig. 1, is of fine, clear, yellow paste, and the design incorporates several bird forms. The second figure is also of fine yellow paste; the design in red brown, apparently incorporates snakes or lightning.

Another bowl (Plate 69, fig. 1) of ocher yellow has a geometric design in hachure and solid color, which is unusual in this locality. The remaining bowl (Plate 69, fig. 2), which is also of ocher yellow, has a geometric design in two sections. In the open area between the sections are two flying arrows.

^a In a forthcoming Report of the Bureau of American Ethnology.

A small dipper with animal handle (Plate 70, fig. 1) has a design on the interior representing corn. Another dipper with animal handle is shown (Plate 70, fig. 2). A cup of fine yellow ware (Plate 70, fig. 3) has an unskillfully drawn decoration on the body. The design seems to be the four-bird symbol arranged in a band. The small bowl with handle (Plate 70, fig. 4) is a fine specimen, exhibiting a geometric design margined with white. It has also marks in sets of three on the rim, a feature often seen on vessels from the southern side of the basin of the Little Colorado and in ruins in other localities yielding gray or red ware.

Five interesting vases are shown on Plates 71, 72, and 73. Plate 69, fig. 1, is decorated with conventional birds, and the second figure bears the four-bird symbol. Vase (Plate 72, fig. 1), has a decoration of unknown meaning; the design is margined with white. The remaining vase (Plate 72, fig. 2) is a beautiful specimen of lemon-yellow color, with elegant geometric decoration. In shape this vase is like the best specimens from Sikyatki and Jettyto Valley. The vases from these ruins are generally of inferior shape to those from the Hopi ruins to the north. A large vase (Plate 73), of rich orange color, from the Cottonwood ruins, bears a geometric design in which hachure is employed.

Three unique bowls of red ware belong to this collection. The paste is dark on fractured edges, but where it is exposed to the fire it burns to a pure brick color. The largest bowl (Plate 74) is decorated on the interior, consisting of three segments outlining a trefoil area in the bottom of the bowl. The exterior walls of the bowl are decorated with frets of narrow white lines, as on the specimen from Stone Axe. (See Plate 62, fig. 2.) The interior decoration is in dark green enamel. Another bowl (Plate 75, fig. 2) has the interior covered with white kaolin slip, and on this ground were painted interlocking frets in bright green enamel. The exterior is red, with a maze fret design in narrow white lines. In one section the space between the lines is filled with green enamel. The bowl is a brilliant specimen of polychrome ware. The third bowl (Plate 75, fig. 1) is one of the most artistic specimens of ancient American ceramics known to the writer. It shows remarkable taste in its design and execution. The bowl is bright red in color; the special feature of its decoration is a zone of white around the walls of the interior. On this band is painted a key design of serrated hooked figures (birds) in green enamel. The center of the bottom is a field of red. The exterior of the bowl also has lozenge designs in narrow lines of white. The field of the lozenge is crossed by vertical lines, in turn crossed by short bars.

White ware.—Another remarkable group of ware was found in the Cottonwood ruins. This consists of two bowls and two vases of fine

white paste, well finished and of good form. (Plates 76 and 77.) The decoration is in enamel leaf green and dark green in color, except in the small vase, which is decorated in red. The enamel is like that on the polychrome ware. The white ware resembles that from Stone Axe in the Petrified Forest Reserve, described on page 323, which also shows a similar enamel paint. The green color is due to the presence of iron, and it is evident that the pigment was applied in a pasty condition from the uneven lines. The enamel, on fusing, also spread and ran into lumps. In some cases the enamel has affected the ground, producing a delicate pink margin around the design. I am not aware of the process employed in producing this enamel. It has been suggested that the ordinary iron pigment may have been mixed with pinyon gum.

The inner wall of bowl No. 212,329 (Plate 76, fig. 1) is decorated with a zone of diagonal frets and parallel lines, inclosed in bands of horizontal lines, divided at intervals by square areas with a dot in the center. The exterior has two double rain-cloud designs and another figure of unknown meaning. The second bowl (Plate 76, fig. 2) has a zone of frets on the interior and on the exterior four equidistant groups of stepped lines in pairs. The texture of this bowl is fine. The unique vase (Plate 77, fig. 2) is also of fine texture. The design consists of three figures, representing four birds on the corners of a quadrangle, inclosing two diamond-shape figures. Around the neck are alternate pairs of vertical and horizontal short lines. The vase has had a short handle, probably an animal head, projecting from the neck. The color of the decoration is a clear, leaf-green enamel, with glazed surface. The remaining vase (Plate 77, fig. 1) has a simple design around the body and a band below the neck in soft red color.

Gray ware.—Some of the specimens of gray ware resemble those of Scorse Ranch. In general, it may be said that the gray ware found in the ancient Hopi ruins is of finer quality and more accurate finish than that of the San Juan. The design and forms also render most of the ancient Hopi gray ware unmistakable.

The casual observer will note that the food bowls, for instance, are rarely so distorted as those found on sites furnishing the gray and the red pottery alone. A dipper bowl (Plate 78, fig. 1) bears an effective design in lustrous black. The vase (Plate 78, fig. 2) is remarkable both for its elegant form and the handle on which is represented a snake with head bent down toward the interior of the vase. This specimen has been overfired, darkening the ground and design, and rendering the paste hard as stoneware. It will be noted that the design is in hachure and solid black. (See page 354.)

A number of small forms of gray ware shown are excellent examples of this type of pottery. The bird-form vase (Plate 79, fig. 6) combines

a conventional representation of the bird topography, with a realistic treatment in the modeling of the tail. The small cup, shaped like a teacup (Plate 79, fig. 3), is of thin ware, and the decoration blends with the background in a pleasing manner. Another cup (Plate 79, fig. 5) is of a form found over a wide range of territory in northern New Mexico and Arizona. Two almost identical specimens are found by Dr. Fewkes and the writer at Homolobi. The ware is fine, and the decoration blends softly into the ground. One of the finest pieces is the four-lobed vase (Plate 79, fig. 4), with a pleasing design in deep polished black. A small vase (Plate 79, fig. 2) is also an artistic specimen, and the dipper (Plate 79, fig. 1) is of the customary form.

Some of the finest examples of coiled ware also come from the Bidahoochee region. Plate 80, fig. 3, shows a vase of good workmanship and a small vase of diversified pattern (Plate 80, figs. 1 and 2). This is the best piece of the kind that has come to my notice. The design is produced by alternate plain and pinched coils beginning at the center of the bottom and extending to the lip, and shows what may be done in the artistic treatment of the coiling.

A number of stone implements are in this collection. These consist of grooved stone hammers, the material, quartzite (Plate 81, fig. 4), ground axes of basalt (Plate 81, figs. 1 and 2), and chert knives, drills, and arrowheads.

Ax No. 212,407 (Plate 81, fig. 1) resembles the double-bitted axes from the Jettyto Valley ruins. Ax No. 212,413 (Plate 81, fig. 4) is of fine white crystalline limestone or marble. The specimen is carefully finished and polished. Four scores are cut on the surface near the groove and seven small pits are sunken on the ridge bounding the planes of the cutting end. There is every evidence that the unique specimen was ceremonial in character. The reader is referred to a double-bitted ax of white stone found by Dr. Fewkes and the writer at Cheylon, which also has four scores on the side.^a A bird carved from white stone is also a fine example of stone carving.

Shell objects were quite scarce in the Cottonwood ruins, only a fragment of a pectunculus shell armlet being encountered. Objects of stone and pottery, apparently spindle whorls, are in the collection. A stone disk has pits on either side, showing that boring was in process.

It is gratifying to be able to contribute one of the links in the chain of Hopi migrations from the Red land of the south and to add to one of the best pieces of archaeological work ever done in the Southwest. Reference is here made to the explorations of Dr. J. Walter Fewkes in the years 1896 and 1897, when he excavated the sites of the ancient Raincloud and Lizard clans at Chaves Pass, in the Mogollon Moun-

^a Report, Smithsonian Institution, 1896, p. 537, pl. XLVII.

tains, at Homolobi, on the Little Colorado River, near Winslow, Arizona, 2 degrees south of the present villages of the Hopi. It was the good fortune of the writer to be present during these epoch-marking investigations.

In an important paper^a by Dr. Fewkes a new clew to the migrations of the Hopi clans, based on the ownership of eagle's nests situated near the ancient seats of the clans, has been presented. The researches of Dr. Fewkes show that the Lizard clan, who migrated with the Raincloud clan, claim the eagle nests at Biddahoochee. It has been conclusively shown that the Raincloud clan settled for a time at Homolobi and that the Lizard clan located near them. From the character of the artifacts, especially from the polychrome ware with green decoration like that on Plate 75, the large ruin at the mouth of Cheylon Creek, 12 miles east from the Homolobi group, was the pueblo of the Lizard clan, which, with the Raincloud clan, followed the natural line of migration northeast along Cottonwood wash to Biddahoochee. Migration follows the water in this semiarid region and the great Cottonwood wash, which with greater precipitation would be a large river, offered abundant facilities for halting and putting in a crop of corn. Perhaps further investigations along the Cottonwood between Winslow and Biddahoochee will reveal halting places of the clans. To the Biddahoochee focus it is also believed that the clan from Stone Axe, east of the Petrified Forest, was drawn, and the proof also rests in the main on the ware mentioned. (Compare Plate 61 with Plate 76.)

East and west along the Moki buttes are sites yielding gray ware, which was probably the kind of pottery made by the northern clans entering into the Hopi complex, the art having been submerged and lost under that brought from the south and east.

The upper portion of the Jettyto Valley lies a few miles southeast of the first Hopi mesa. Its trend is southwest, paralleling Keams Canyon, and its waters find their way into the Little Colorado near the Cascade.

The valley is quite deep and wide, as travelers from Holbrook to Keams Canyon will testify from experiences in crossing it and climbing the Keam mesa. The north side of the valley here is walled by a high, abrupt sandstone mesa; the south side presents gentler contours, except to the east, where the head branches run in canyons. Navahos off the reservation have undisputed possession of the valley and their hogans and corn fields are frequent along the wash. A number of very large ruins are situated on promontories of the Keam mesa overlooking the valley. They begin at the Awatobi mesa, southeast of Walpi, and extend to "Mormon John's" spring, $2\frac{1}{2}$ miles east

^a Property Right in Eagles among the Hopi, *American Anthropologist* (N. S.), II, Oct.-Dec., 1900. Also Nineteenth Annual Report of the Bureau of Ethnology, Pt. 2.

of Keams Canyon School (Plate 82). Beginning on the west, the Hopi name the ruins Awatobi (Great and Little), Kawaiokuh, Chakpahu, Nesheptanga, and Kokopnyama, and on the south side of the valley, opposite the latter, Lululongturqui. Several smaller ruins are interspersed among the larger ruins, principally on the mesa top some distance from the edge; a few lie on the southern side of the valley. The cultivable tracts along the wash are strewn with potsherds.

Previous to 1901 the only Jettyto ruin scientifically explored was Awatobi, excavated by Dr. Fewkes,^a and subsequently by Dr. Frank Russell, of Harvard University. Plans of the larger ruins on the northwest side of Jettyto Valley were made by Victor Mindeleff.^b His "Mishiptonga" is Kawaiokuh; "Bat House" is Chakpahu; "Horn House" is Kokopnyama wrongly located; "a small ruin between Horn House and Bat House" is Nesheptanga. The ruin south of Kokopnyama, called Lululongturqui, is not described. It may be said that the examination of most of these ruins is attended with hardships because of the lack of water. Awatobi still has fine springs, and this fact, coupled with its accessibility, would sooner or later have led to its excavation. Water can be had within 1½ miles from Kokopnyama, also. The lack of water, however, has not prevented the Navaho tearing the Jettyto ruins to pieces in search of pottery for the trader.

The first Jettyto ruin worked by the Museum-Gates expedition was Kokopnyama, a Hopi name meaning "firewood people."^c The Navaho name is Delcalsacat, "wild gourd," and the name given it by white people is "Cottonwood ruin," from the trees, growing in one spot near by. It is located on a low, easily accessible mesa near Maupin's store, at Mormon John's spring, 2½ miles east of Keams Canyon School, and so far as known is the easternmost of the Jettyto Valley ruins and one of the largest.^d

The ruin is commandingly located on the mesa top, affording an extensive view over the valley below and over the country toward Keams Canyon (Plate 83). In the distance the Hopi Buttes fret the horizon with their remarkable outlines. Juniper and pinyon trees and an occasional oak clothe the top and flanks of the mesa. Large junipers grow near the ruins, but no trees occupy the zone of habitation. The location of the ancient spring is marked by four cottonwood trees growing close against the mesa; much digging near these trees has been done by Navaho in a futile search for water. Toward the valley the zone of pottery fragments extends for more than a mile, and

^aSeventeenth Annual Report of the Bureau of American Ethnology; Report, Smithsonian Institution, 1895; American Anthropologist, Oct., 1893.

^bEighth Annual Report of the Bureau of Ethnology.

^cThis name refers to the clans which lived here and is probably not the ancient designation of the village.

^dFor Mindeleff's plan see Eighth Annual Report of the Bureau of Ethnology, pl. vii, and brief description, p. 50.

beneath the village, heaped up against the mesa, is a great talus of house refuse. To the east of the site are sand dunes from 10 to 30 feet high, among which fine specimens of juniper flourish. Vegetation is scanty on the mesa, *Bigelovia graccolens* protecting *Tradescantia scopulorum* and other small herbs from browsing animals. On the talus below the mesa the customary Hopi berry bushes, *Lycium pallidum* and *Ribes cereum*, thrive.

An examination of Mindeleff's plan will show the lack of order in the accretion of house groups going to make up this pueblo, due in great part to the configuration of the margin of the mesa. The rear wall is the only uniform feature; the intermediate area seems to have been built over in a haphazard manner.

Portions of the pueblo were formerly at least four stories in height above the spring and along that section. Below the mesa many houses were built among the rocks, where excavation exposed walls running irregularly on account of the nature of the ground. Places of burial were found in these houses and under the rocks and in crevices, as is now customary in the latter case at the Hopi pueblos.

No walls remain standing on the ruin, and there are no traces of house beams.^a Excavation in the rooms showed walls rather poorly built of coarse soft sandstone laid in mud. Many of the rooms were plastered.

A group of lower rooms 7 feet square on the edge of the mesa above the spring and having the mesa as a floor were excavated. The walls were chinked with small stones; the fire hole was on the floor at the southwest. Small, low doors or openings between the rooms were noticed. On the floor lay lumps of clay, paint, flat mealing stones, small mortars, etc. The pottery in these rooms was altogether gray and red, a fact to be noticed later. No subterranean kiva could be found here or in any of the Jettyto ruins examined. Such kivas existed at Awatobi, however.

Scattered over the surface are vast numbers of potshards, almost invariably of yellow ware, many pieces showing interesting symbolism. At one spot near the edge of the mesa pottery was burned, leaving heaps of cinders and ashes. Lignite was used as fuel, the débris filling the houses and falling below the mesa, being largely composed of coal ashes derived from burning "bony" lignite. At the foot of the mesa south of the wash is a vein of pure coal 7 feet thick, and at this point is abundant evidence of pottery burning. Some fragments of vessels picked up had clinkers fused to the surface, and specimens of pottery burned to the hardness of stoneware occurred in the débris.

On a bench of the mesa a fire box was seen near a series of "gardens"

^a A number of beams from Awatobi are incorporated in the houses of Hano and Walpi. Some of these may be seen in Nampeo's house at Hano. They were secured by her husband, Lesu.

demarked with parallel lines of large stones. A small cist (Plate 84) was discovered in the cliff and photographed by Mr. Gates. This had been broken into, and there is now no means of ascertaining its purpose. The cist may have been made as a receptacle for cult objects. A single pictograph rewarded the search. This was on the face of an immense block of sandstone fallen from the rampart of the mesa. The pictograph, which apparently represents a mask, is obscured by weathering, and its preservation seems to be owing to a covering of lichen. The cliffs were searched for shrines without results.

Some time was spent in the endeavor to locate the cemetery. The sand dunes 200 yards back of the pueblo seemed favorable from the number of potshards there, but nothing was found, and it was thought that this cemetery had been destroyed long ago by the moving sand. It appears that several parties of prospectors for pottery met with disappointment at this ruin. The main talus of village refuse had been untouched, and excavation here yielded a fair collection, which has the distinction of being all that remains to tell of the ancient inhabitants of the pueblo of the firewood people.

The soil of the talus has been greatly solidified by pressure, the burials often showing as a mere narrow band of organic materials. Excavation was carried on by running a trench across the talus and carefully paring off the face, which was from 5 to 8 feet high. (Plate 85.) The bodies were placed with the head to the northwest, the face toward the mesa, the legs being flexed. Mats were wrapped around the body, and the remains of coiled and wicker baskets, cord of hair, cloth of animal fiber, and feather textile show a considerable variety in this class. Near the head were usually found lumps of gray and yellow clay, red and yellow paint, and a flake knife of flint; the pottery also was placed around the head. The bones were extremely decayed, and in most cases had so disintegrated that no specimens could be saved. In one burial at the moment of uncovering the body by the falling away of the earth a skull was found retaining the hair in excellent preservation, tied with a human hair cord at the sides of the head. (See Plate 86.) The skull, however, fell to pieces in a few minutes. Small balls of clay like marbles were found in the graves. Beads and ornaments were almost lacking, and only one small oblong of turquoise was encountered. Pahos also were not seen. Many of the burials were without mortuary offerings, and rarely more than three pottery vessels were taken from a single interment.

The pottery is yellow and as a rule is inferior in quality to the fragments scattered over the ruin. In deep diggings at the bottom of the talus some burials had only gray and a little red ware. On the slope below the mesa at the east side of the pueblo in indurated sand at a depth of 3 feet were found four pieces of black and white ware, consisting of a vase with animal handle, a cooking vessel with handle,

a cup, and bowl. The vase contained black and white beads of stone and shell, tablets of red stone, and pottery ornaments all pierced for stringing. Parts of a child's skull and femur were found near by, but no bones were directly associated with the pottery, and extensive diggings brought to light no other burials or remains at this place.

Some work was done at Nesheptanga,^a a ruin of fair size, in the neighborhood of Kokopnyama, situated on the mesa about 100 yards from Maupin's store. The buildings conform to the mesa edge toward the west and the village terminates to the east in a wall crossing the mesa. Fragments of fine yellow pottery are scattered over the ruin. Burials were made among the rocks in débris from the village. The cemetery among the rocks below the mesa had been dug out by the Navaho, and few specimens remained. Several smaller ruins a few miles west of Nesheptanga were inspected. One of these of good size is located on the mesa at the head of a long gulch leading into the Jettyto Valley. The ware here is yellow and of good quality. A smaller ruin in the same neighborhood showed fragments of large napiform vases characteristic of Tusayan. The small sites showing gray and red ware presented few features of interest. The ware is coarse, and it is apparent that the inhabitants were poor. The presence of ruins of this class in Tusayan, however, is interesting. (See p. 332.)

The ruin called Lululongturqui, located across the Jettyto Valley from Kokopnyama, was carefully examined, but not excavated. It is of medium size and has a commanding situation on the mesa. The mound stands high, and the village plan shows a rounded outline, reminding one of some of the Canyon Butte ruins. Adjoining the village in the north quarter are many oblong garden plots bounded with lines of stones. It is an interesting fact that the pottery of this ruin, while mostly gray and light red, has a fair proportion of fine yellow, either indicating that the people making the red and gray ware were contemporaneous with the makers of yellow ware or that the latter supplanted the former. Unfortunately the evidence of the graves could not be obtained. The Hopi name of the ruin is worthy of remark. Some work had been done here by the Navaho, and it appears that burials had been disturbed close to the town walls. Two small ruins with coarse red and gray ware one-half mile east of this ruin on a branch of the Jettyto Wash were visited. These ruins had been worked by the Navaho and a few pieces of pottery taken out.

CHAKPAKU.

About midway between Kokopnyama and Kawaiokuh lies a very large ruin called by the Hopi "Chakpahu," Speaker Spring. It is located on a spur of the mesa and overlooks the Jettyto Valley and a

^aMindeleff's "small ruin between Horn House and Bat House."

deep gorge to the west. The ruin was surveyed by Victor Mindeleff in 1885.^a The prominent features of the ruin are the defensive wall and the great court or plaza which overlooks the gorge. No walls are standing, and the house plans can in few cases be traced among the mounds of rubbish. Vast quantities of potshards are mingled with the débris. The ware is of the finest quality, the best in texture and decoration to be seen on any ruin in Tusayan. The prevalence of fragments of large napiform vases at Chakpahu is noteworthy. The shards are bright and fresh looking as though recent. Many superb specimens from this ruin have gone into the various collections made by Mr. T. V. Kean. The cemeteries, which were in the débris between the houses and the mesa, have been rifled by Navaho. In 1893 the spring below the mesa was dug out by the Navaho, and many vases and vessels of various forms, like those found by the Museum-Gates expedition at Kawaiokuh, were encountered. A short account of this find, with illustration, was published by James Mooney.^b

A ruin furnishing yellow ware is said to exist on the south side of the valley, nearly opposite Chakpahu, where Maupin's new road descends the mesa. The ruin was not seen, but some specimens were bought of Navaho, one a canteen in yellow ware, with ancient decorations, and shaped like those used by the Hopi.

KOKOPNYAMA.

There is at Kokopnyama, as may be expected, a preponderance of useful forms in pottery, represented by bowls, vases, dippers, cups, and cooking utensils. Large water vases, with rugose surface, without decoration, are also represented here, but in limited numbers. The concave disks of pottery, with holes punched around the edge, are almost lacking at Kokopnyama. It is conjectured that these objects may have been used as revolving rests for ware during the process of manufacture, as are the tabipi or bottom forms, employed by the potters of Hano at present. A portion of this customary imperforated disk, with clay still attached to the concave surface, was found in this ruin.

A vessel of very thick ware, showing traces of fire, is believed to have been a brazier, in which coals were kept alight. I have observed such vessels in use among the Zuñi.

Small objects of pottery were somewhat numerous, such as toy cups and bowls, frequently unbaked and showing the touches of childish fingers; a rattle with perforated globe, clay balls, toy dippers, and a number of animal handles representing the wildcat, badger, mountain sheep, wolf, etc. One of these, probably a wolf, is covered with a

^a Eighth Annual Report of the Bureau Ethnology, p. 52 (map faces p. 26).

^b American Anthropologist, July, 1893, p. 283.

thick enamel caused by fusing in the fire at great heat. A few disks worked from pottery fragments, and a fragment bearing the lug of a canteen reground in the shape of a frog, were encountered. Spiral appliqué ornaments for pottery, like those on Zuñi cooking pots, were used here, as fragments attest. It is worthy of remark that the minor works of pottery mentioned are fewer and somewhat ruder than those found in the ruins to the west.

Objects of shell are extremely rare in this ruin, a few unworked bits, a fragment of a large armlet, and a few conus and olivella beads being the sum total secured.

Worked bone is also scarce, with the exception of small awls. A few bone beads, small tubes, and a rib knife were taken from the excavations.

Stone implements are numerous here. Flint cores, arrowheads, knives, scrapers, flakes, and drills represent objects and materials of chippable stone. The workmanship, however, is poor. Spherical hammer stones, grooved hammers, an ax hammer, a simple grooved ax with poll, and a double-bitt ax were taken out. A sandstone upon which are grooves made in sharpening paho sticks, arrow smoothers, rubbing stones, small mortars and pestles, and pottery polishing stones were collected. Fragments of hand stones for grinding corn were seen, but no flat grinding stones were found in place in the rooms and very few were observed on the surface, though undoubtedly they were in constant use. The absence of surface relics of this character is due to the proximity of these ruins to the inhabited pueblos, who find use for many things abandoned by the ancients.

Several stone spheres, of a size suitable for club heads and probably originally put to that use, were secured.

Ironstone concretions of many interesting forms weathered out of the sandstone ledges are scattered in the débris of this ruin. A few in the collection have been worked in improvement of the suggestive natural form. These usually take the shape of miniature, well-finished cups. A curious toy grooved hammer of sandstone, painted red, was taken from the débris of a room.

Ornaments were made from a white limestone and a fine-grained clay stone of good red color. Thin disks of the latter stone, with perforation near the edge for suspension, are numerous. Turquoise was practically absent at Kokopnyama. Two fragments of tubular pipes were secured, one of beautifully banded stone and the other of pottery. Selenite fragments were scattered through the débris, also a few chips of obsidian and chalcedony like that of the Petrified Forest.

Of pigments, numerous examples occur at Kokopnyama. The most abundant is a dark red derived from the "bone" in burnt lignite and from the clay stone used for ornaments; yellow occurs as yellow ocher and ocherish clays, green as copper carbonate and arena-

ceous clay, and white from decomposed chalky limestone. Several fragments of dark brown iron ore showing marks of rubbing are examples of the stone used by potters for the brown pigment.

Bones of small animals were very scarce in the débris. Those found were principally of the two species of rabbit. Bones of the dog, fox, eagle, and turkey were also observed.

Numerous specimens of textiles were discovered in the cemetery during the excavations at Kokopnyama. Matting of twilled weaving was commonly employed to envelop the body preparatory to burial. In contact with the body also was found a very interesting textile, if so it may be called, but more resembling a rather thick felt of downy feathers, presumably of the eagle. This cloth was usually found on the face of the dead and is never of large extent. It may have been a mask of down for which cotton was substituted at a later period. Dr. Fewkes mentions mortuary masks of cotton as having been traditionally used by the Hopi. In one instance a twisted two-strand cord of hair still binding masses of hair was found. (Plate 86, figs. 1 and 2.) A number of specimens of coiled and wicker basketry were taken out. (Plate 87.) The coiled basket is of close, fine work, and will be described by Professor Mason in his forthcoming work on basketry. The wicker basketry is of the ordinary type at present made at Oraibi. Several knots tied in yucca-leaf strips are shown in Plate 97, fig. 2. A thick lock of hair bound with yucca and saturated at the basal end with red pigment is thought to have been a brush, perhaps a brush for producing spatter work on pottery.

Beans of a long variety, corn, and squash seed and indistinguishable remains of food were found with the dead.

The absence of fetishes of worked stone is not unusual in the ruins of northeastern Arizona, but the absence of pahos with the interments at Kokopnyama is remarkable. It must not be said, however, that the Kokop people did not employ pahos, for the most important cemetery, which has either been swept away or is yet undiscovered, may have contained them. Still, the lack of pahos with the burials in the extensive ash talus of the pueblos must be taken as positive evidence, proving a considerable variance from the neighboring pueblos to the west in this respect.

KAWAIOKUH.

This very large ruin is situated much as Chakpabu, on the top of the mesa between two gorges. It lies a short distance to the west of the Keams Canyon road, where it reaches the level of the mesa, 2 or 3 miles above Jettyto Spring at the "Rock House." (See Plate 82.) Communication is rather easy over the level mesa to Awatobi, near which is a Hopi settlement around a fine spring.

Kawaiokuh has a commanding position, giving an extended view up

and down the Jettyto Valley. (Plate 88.) Juniper trees come close to the ruin and are abundant on the mesa, not having been consumed for fuel, as near the present Hopi towns. This is due, perhaps, to the use of lignite at Kawaiokuh. During the winter the Navaho move up from the valley to their hogans among the junipers, where fuel is convenient and snow furnishes water. Many varieties of plants grow on the mesa, which at this elevation (6,200 feet) assumes the aspect of the White Mountain slopes.

In the gorges below the ruin are seen springs which hold out for some time into the dry season. Jettyto spring issuing from the shales at the base of the mesa is permanent, and no doubt furnished water for Kawaiokuh, though at the cost of much labor in bringing it up to the pueblo.

The front of the village was built close to the edge of the mesa, though enough space was left for passage around. The rear of the village is comparatively straight." The houses near the edge of the mesa were several stories in height, and some of the rooms were large and well plastered with red clay mixed with sand. The walls of a room excavated were covered with numerous coats of plaster, on the surface of which various designs had been painted in color. (Plate 89.) The floors were broad slabs of flagstone. The masonry is of small cubes of sandstone laid in mud and shows inferior workmanship like that of the present pueblos. No scattering houses were to be seen around the pueblo nor were there traces of shrines or pictographs.

On the bench below the cliff a pottery-burning place was discovered, and by carefully removing the layers of soil the bed on which the pottery was set up was exposed. (Plate 90, fig. 1.) This layer was made up of ashes mainly composed of the slaty portions of the lignite burning white or red. There were bits of white sandstone also, and charcoal of twigs and stones. Near this spot was unearthed a heap of fragments of vessels broken in firing. (Plate 90, fig. 2.)

Kawaiokuh has been devastated in a thorough manner by the Navaho, and there was grievous evidence that their wasteful methods had destroyed far more than was saved. The burials in which the finest ware had been placed were found in the débris among the rocks at the foot of the cliff and extended entirely around the front of the pueblo. The slope at the west side of the village above the gorge had also been an important cemetery. There is no cemetery at a distance from the pueblo, as at Awatobi, and it appears that the latter pueblo is unique in this respect among the related Jettyto ruins.

After numerous trial excavations it was determined to clear out one of the higher house masses on the edge of the mesa. Very soon in the course of this work it was discovered that the front rooms had been devoted to burials and eventually a considerable collection of pot-

^a See Mindeleff's plan, Eighth Annual Report of the Bureau of Ethnology.

tery, etc., was taken out. As many as eight interments had been made in one room at different levels. (Plate 91.) A large coiled jar, sealed with clay and having the rim of a fine vase luted on, was unearthed beneath the stone floor of a room. (Plate 92.) The jar contained only a quantity of clean sand in pellets, the grains loosely cohering in globular form as though arranged by some obscure natural process. This deposit was perhaps of sand for ceremonial purposes. Offerings of corn, beans, cotton seed, etc., accompanied these burials. The skeletons were decayed beyond preservation. The burials below the mesa held the ware of the finer class almost exclusively, so far as could be ascertained from the fragments of beautiful texture and design left by the Navaho around their excavations. A few interments that had escaped the Navaho were encountered during the work. Mats of yucca strips were wrapped around the bodies and these placed on wicker trays or constructions of small twigs. Food offerings of young corn ears and bread were placed on coiled baskets and numerous elaborate pahos arranged around the body. It seems plain that the important cemetery was at this location, and it is regrettable that so little remained where there had been so much valuable scientific material. With the specimens from the house cemetery, however, and those from the excavations in the débris and from the surface of the ruin a considerable collection was formed, containing many interesting objects.

In the neighborhood of Kawaiokuh are several small ruins yielding gray ware, a specimen of which is shown on Plate 95, fig. 1. While in camp here a Navaho brought in two fine pieces of this class from a ruin, described as large, in the Moki Buttes, about 25 miles distant. One of these pieces is a large globular vase well decorated.

Artifacts, Kawaiokuh.—The remark as to the useful forms of pottery vessels at Kokopnyama applies also to this ruin. A greater number of specimens were collected at Kawaiokuh than at the former site, and as noted the æsthetic ware is more abundant; likewise, there are many small objects of different classes showing that the potters' art was quite diversified in this pueblo.

In detail, attention may be called to a small vessel in form of a frog; the ware is fine yellow, and the modeling is aided by decoration in dark brown (Plate 93, fig. 1). Another of this class is a vase in form of a parroquet, of excellent workmanship and decoration (Plate 94). A vase of gourd form also displays much taste; and a vase of the oriental "pilgrims' gourd" shape, a form rare in this region, is represented in the collection. An oblong canteen form, from which the handles have been broken, bears a symbolic decoration on the sides, and at the ends conventionalized faces. (Plate 93, fig. 3.) A well-formed dipper in perfect preservation is shown in Plate 93, fig. 2.

A vase of gray ware with spiral decorations on the shoulder (Plate

95, fig. 2) was taken from the house cemetery at Kawaiokuh. The ware is remarkably thin, so much so as to raise the question whether the vessel could have been made by coiling, and yet there seems to be no alternative.

A bowl, one of several, of salmon color (see Plate 100, fig. 2) must be mentioned. The paste is dense and of the same fine character of the ware from this region; it is probable that to produce this color either a little yellow ocher was added to the clay or the clay was selected for the purpose. In either case the bowls have the look of strangers amidst the fine ceramics of Kawaiokuh; especially is this remarked when one considers the rudely drawn design in brown bordered with white, a style extremely rare in ancient Hopi pottery, where white is not a potter's pigment. White-margined decoration is found at Honolohi, and in many of the ruins along the White Mountain plateau it is common. Possibly the woman who made these bowls was following the traditions of the potters of her clan, which may not have been represented at Kawaiokuh except by herself.

The fancy of the potter was expressed in many small works, as in the handles of the cups and vases, which often represent animals with accuracy and again with grotesque or humorous treatment. The handle of a cup (Plate 93, fig. 4) is an example of the latter. By setting the mouth of the animal at an angle a peculiarly whimsical expression was produced by the artist. Figurines of a dog going on three legs (Plate 96, fig. 12) and of the same animal apparently curled up in sleeping posture were found. Ornaments in shape of birds perforated for wearing are frequent. (Plate 96, fig. 11.) One of these in the collection is a superior piece of modeling; the tail and extended wings are vaned by notches pressed in the clay and the body is decorated. (Plate 96, fig. 9.) Small ornaments in shape and decoration designed to imitate shells are also frequent. (Plate 96, figs. 7, 8, and 10.)

Pottery bells like those found by Dr. J. Walter Fewkes at Awatobi^a and first described by him from this region are somewhat numerous here. They are hollow spheres, having a narrow aperture like the sleigh bell, and as to devices for fastening to a cord or to garments are of two classes; one with a perforated tang, and the other having a pair of holes opposite the aperture. One of these specimens retains the pellet of clay forming the sounder and on being shaken produces an agreeable tinkling sound. These bells are undoubtedly of aboriginal manufacture.^b

^aSeventeenth Annual Report of the Bureau of Ethnology, p. 629.

^bDuring a meeting of the Anthropological Society of Washington, at which the results of the Museum-Gates expedition of 1901 were presented, the question of the aboriginal origin of the so-called hawkbell was canvassed, the evidence presented going to show that such bells are prehistoric on the American Continent, although at an early date bells of a similar form were articles of trade, being in universal demand by the native tribes and scarce with them at any period.

Toy pottery vessels are plentiful, representing vases, cups, dippers, and bowls; one in form of a gourd, and one miniature vase of gray ware of excellent form and finish should be mentioned. A pottery object in form of a hollow cone, with perforations around the base, is supposed to have been used as the nose of a mask. Several tubular pipes (see Plate 52, fig. 4) were taken out.

Hundreds of fragments of the concave disks of rude pottery with perforations around the edge, indicating a diameter of from 8 to 12 inches, were seen in the débris. (See p. 337.)

Among the pottery objects found at Kawaiokuh is a fragment of a thick rectangular slab, with two shallow saucers in the upper surface. From traces of adhering color, this was no doubt used for mixing paint.

Stone working at Kawaiokuh had not reached by many degrees the perfection attained in clay working. This remark is true for the whole Pueblo region, where the worked stone is much inferior to that of the ancient inhabitants of Ohio. Still, in the Pueblo region, there was considerable variation in workmanship among the different tribes and also in some lines, as in mosaic and bead making there was great proficiency. It must be said that for careless and crude manufacture of stone implements, the tribes going to form the Hopi complex were among the first, though on the other hand quite a variety of implements, ornaments, etc., were fashioned of stone.

The primitive spherical hand hammer is common at Kawaiokuh, where it was employed, no doubt, for battering corn mills, etc., as it is among the present pueblos, where the writer has observed it in use.^a Grooved hammers of different sizes are also found. The large grooved hammers seem to have been used in wood gathering; they are sometimes met with among the juniper trees at a distance from villages. Axes, sometimes double-bitted, had their principal use also in getting out beams and chopping wood. Occasionally ceremonial implements in the form of highly polished axes and hammers of actinolite, a beautiful and much-prized stone, are picked up on the ruins. Two fine specimens of this character were secured from Sa-a-la-ko, the chief Snake woman of the Hopi, mother of the leader of the snake fraternity of Walpi. Aside from actinolite, the material of hammers and axes is chert, sandstone, and basalt of inferior quality.

The arrow smoothers from this locality were made by securing a suitable piece of stone, dressing down a face, and making a groove across it. The materials are coarse and fine sandstone, claystone, and soapstone. This implement must be divided in two classes, one in which the arrow-shaft was smoothed by attrition, and the other in which when the stone was heated the shafts were straightened. In the latter class often a companion stone, also grooved, was placed over

^a American Anthropologist, X, June, 1897, p. 191.

the shaft and the latter drawn to and fro through the channel. Small cup-shape mortars of coarse sandstone were found at Kawaiokuh and a slab of fine-grain sandstone with shallow cavity in which iron paint had been triturated. Pottery-smoothing stones are numerous, and small slabs of fine grit wood opal, used presumably in stone working, were picked up. There were also cylinders of coarse stone, probably employed as rasps.

Ornaments in form of round and oblong tablets of red-clay stone like that used at Kokopnyama are shown (Plate 96, figs. 1-3). A drilled tablet of buff limestone is also shown (Plate 96, fig. 4). A small object of hematite, neatly carved to represent a wolf and having a hole drilled through it for suspension, is probably a fetish (Plate 96, fig. 6).

The arrowheads at this site differ very much in size from slender specimens three-fourths of an inch in length to those $2\frac{1}{4}$ inches in length. Many of them are serrated; such arrowheads are common in northeastern Arizona. The materials are various—chert, quartzite, quartz, agate, jasper, obsidian, and chalcedony. A number of knives were collected, mostly rudely chipped, though some show rather good work. Scrapers consisting of irregular spalls of chert, chalcedony, and obsidian worked on one edge are numerous. Obsidian is more plentiful at Kawaiokuh than at the neighboring ruins. Several perfectly formed chips found in the débris are believed to have been used as miniature mirrors. The Navaho are familiar with such use of obsidian flakes.

No crystals of quartz commonly found in the pueblo ruins were observed at Kawaiokuh. A few beads of fine turquoise were picked up in the débris, but no specimens were placed in the graves.

Several chipped fragments of vitreous stone, some of which seem to have been fused, were thought to be artificial, or rather to have been produced by accident in burning pottery at a high heat.^a We have seen that fused masses of green enamel sometimes occur on fragments of pottery among the ashes at the pottery-burning places, and suggest that the people of Kawaiokuh were near to the independent discovery of glass.

Objects of shell are comparatively few at Kawaiokuh, although there is much more here than at Kokopnyama. Among the specimens secured were a fragment of shell pendant, a fragment of amulet drilled for a pendant, conus and olivella tinklers, a small circlet cut from a pectunculus shell, and a circular ornament with scalloped edge having a hole cut through the center.

Small bone awls like those used by the Hopi for basket work and sewing are common. Tubes of bird bone and of a few deer bones cut off with flint were collected. One of these tubes has a hole cut through

^a This mass has been tested by Dr. George P. Merrill and is found to be a slag.

the wall near one end and was probably made for a whistle. The tips of an antler and several other bones appear to have been employed in flint chipping. A circular ornament cut from the skull of some animal and having a hole near the edge for suspension was taken out.

The pigments used for various purposes at Kawaiokuh were found to be similar to those collected at Kokopnyama.

Wicker and coiled basketry like that described from Kokopnyama was made at Kawaiokuh (Plate 97, figs. 1, 2, and 4). The bed or mat of twigs often placed beneath the more important dead was, as far as the condition of the specimens allow to be made out, constructed of interlaced shoots of *Rhus trilobata*, the ends of the shoots turned in and thrust among the interlacings forming an edge. Matting of yucca, the making of which has been long discontinued among the Hopi, was also used to enwrap the dead, as shown (Plate 97, fig. 5), where remains of matting adhered to the lower jaw of the skeleton. Strips of the fibrous leaf of the yucca were used for tying.

Specimens of the felt-like masks of the down of birds were also collected at Kawaiokuh, as at Kokopnyama. (See p. 339.)

Squash seed, beans, corn, and cotton seed were found in the graves. Sometimes a bunch of ears of corn, probably roasted and secured together by the husks for hanging in the house as the Hopi do at present, were uncovered. The cotton seed resembles in size and appearance that still raised by the Oraibi at Moenkopi.

The offerings of prepared food to the dead in the ancient ruins are rarely in such condition as to admit of identification. At Kawaiokuh, however, one of these offerings was plainly a round, thick tortilla, such as the Hopi call pilabaki.

While at Kokopnyama pahos seem to be absent; at Kawaiokuh they are numerous in the graves and are the only wooden objects that have been preserved. It may be said that the cause of this is the carbonate of copper pigment with which the pahos were covered. Three kinds of pahos were noticed—one a short, slender stick sharpened at one end; another larger, with carved head, and still another a stout rod having a flat tablet fastened to the upper portion.^a No traces of other colors than green are observable on these pahos. Remains of pine needles and feathers still adhere to the tablets, and in one case the small mass of meal (nūsha, "sustenance"), customarily added by the Hopi to certain pahos, as those of the flute society, was preserved.

In regard to the distribution of pahos in this region, it may be said that while they are sparsely represented in the ruins of the Little Colorado Valley and the north side of the White and Mogollon mountains, they are most numerous in the ruins around Hopi mesas, especially in the latter ruins. In the excavation of Old Wolpi,

^a See Seventeenth Annual Report of the Bureau of American Ethnology, pp. 736-739, for pahos found by Dr. Fewkes at Awatobi and Sikyatki.

Mr. C. L. Owen, of the Field Columbian Museum exploring party, took out many hundreds of these interesting objects, proving that here is the center of greatest prevalence of pahos. The origin of the custom can not be ascertained as yet, nor is there data as to its extent in the Pueblo region. Presumably the elaborate pahos were an accession from the Rio Grande coming in with the complicated Katchina ceremonies."

PERIODS OF TUSAYAN WARE.

It may be well to notice here the characteristics of the ware of the different periods as marked by the incoming clans. The settlements of the first period are small and obscure and have not been excavated. From surface indications, however, it is found that the ware is rather coarse, and that there is a greater proportion of gray and red ware than in later ruins. The small sites showing only gray ware and red ware have been mentioned, and these may indicate early clans with the technic of the San Juan region. To the north and west of Tusayan such ruins are numerous, coming close down upon the area of the yellow ware. The traditional Hopi ruins at Black Falls, discovered by Dr. J. Walter Fewkes, are of this class.^b The decoration of this ware is geometric, and animal forms or symbolic figures are almost lacking.

The second period begins with the initial coming of the clans from the south. These people are well represented at Homolobi, near Winslow, Arizona, where exist a group of ruins explored by Dr. J. Walter Fewkes and the writer in 1896, and the group near Biddahoochee, described in this paper (p. 326). Here we find a considerable diversity of color and quality of ware. The fine yellow ware is well represented, but we have gray ware, red ware, polychrome ware, and coiled vessels with marked coiled decoration different from the obscure coiling of the ruins near the Hopi mesas.^c

The decoration is geometric, but not derived from the same motives as in the gray ware of northern localities. There is more fertility of invention in handling motives which are in a transition from more complex symbolic subjects in the main primarily realistic. This gives, for example, the interior decoration of bowls a greater variety in the matter of placing the design over the whole area, whereas in the black-and-white northern ware the design is usually arranged in four areas between the arms of a cross, leaving a square or circular field in the

^a Most of the traditions ascribe the introduction of prayer sticks to the Water House people of the South. See Fewkes, *Tusayan Migration Traditions*, Nineteenth Annual Report of the Bureau of American Ethnology.

^b *American Anthropologist* (n. s.), II, July-Sept., 1900.

^c The migration from the south has also been in progress for a considerable period, extending up to comparatively recent times. It must be said, however, that these clans brought with them pottery that appears to be more ancient in type than that brought by the Rio Grande clans.

middle of the bowl scarcely ever occupied by a symbolic design. The designs are almost invariably angular and rarely undertake the voluted or curved designs of other regions.

Invariably, also, the ancient Hopi ruins are richer in shell, turquoise, and objects of aboriginal art than other ruins of the Southwest.

The extent of the impress upon the Hopi of the art of the clans coming from the south is not clear at present, as the ancient sites have not been explored to any extent. In the summer of 1901 Dr. George A. Dorsey and Mr. C. L. Owen, of the Field Columbian Museum, excavated on the site of Old Walpi, the "Ash Heap," as it is called, securing a large collection, which, when it is available, will probably throw light on the transition period.

It appears that comparatively recently the potter's art died out among the Hopi of the Middle and East Mesas and that by the law of village specialization of an art, Oraibi retained the making of pottery until shortly after 1872, when Dr. J. W. Powell visited the pueblo. The later Oraibi art shows marked Zuni influences. The Tewans, however, practiced the art uninterruptedly, and it has come to be that the people of Hano are the only potters remaining in Tusayan, and that finally, at the close of the fourth period, the pottery used by the Hopi is of Rio Grande extraction, even though it has become thoroughly debased, like many of the arts of the American Indians. Nampeo, an intelligent Tewan woman, however, is endeavoring to revive the glories of the former times.

The third period, the golden age of Tusayan, begins with the great migration from the Rio Grande. To this period belongs the splendid ware procured by Dr. Fewkes at Sikyatki and Awatobi,^a the Kean collections at Peabody and Chicago, and the collection from Jettyto Valley by the Museum-Gates expedition.

In texture and decoration this pottery is the best in North America and ranks with the finest of Mexico and Peru. In decoration it is perhaps superior, for it must be remembered that the highest efforts of the potter in those countries belong in the class of sculpture, which is hardly represented in Tusayan, nor indeed in the Pueblo region, except where it connects with the Mexican culture on the southern border.

The ware of Jettyto Valley is preponderantly yellow, ranging from cream color to yellow ocher and occasionally reaching orange. Brown and salmon color also occur, with a few sporadic examples of gray and red.

The texture of the ware is fine and homogeneous; the absence of sand or *dégraissant* is notable, which speaks well of the cretaceous clays that occur as partings in the sandstone rocks of the region. These clays also contain little iron and that is such chemical form as to

^aSeventeenth Annual Report of the Bureau of American Ethnology, Pt. 2.

impart only a yellowish tint of great beauty to the burnt ware. The clay burns to remarkable density and stands a high heat in the kiln. Sometimes overburning produces a paste with the hardness of stoneware, but high heat usually darkens the surface and obscures the design.

A lively appreciation of symmetry of form is evident and the surface finish shows the greatest care, no part being slighted, differing in this respect from the gray ware of the north, in which the exterior surface and edge usually have not been treated with the polishing stone. On account of the careful finish of the Jettyto ware no traces of coiling or other processes may be seen; in fact, the potter was careful not to have even marks of the smoothing stone on her vessels, so that the surface is agreeable to the touch, like polished ivory. Not having received any surface wash of clay, the vessels are never crackled.

There is no doubt, however, that the structural method of coiling was practiced and that the basal processes were similar to those employed by the potters of Hano at present.

The pigments, also, were of iron ores and earths, like those used by Nampeo at Hano. These are *tóho*, or ironstone and *sikyátotoho*, or yellow ocher; in unskillful hands these produce, the former dark brown answering to black, and the latter dingy reds. Nampeo has in her recrudescence of the old art found it necessary to select these pigments for various qualities, depending on the purity or impurity of the material, or just as she also selects her clay. Her efforts, while commendable, serve to heighten our appreciation of the discrimination of the ancient potters in selecting and handling their materials. Their command of the resources of color may be observed in Plate 98, fig. 2, where on an old ivory ground may be counted seven graduations of yellow, red, and brown; fig. 1 of this plate is also a fine example of color and texture. These graduations are intentional and show a knowledge of the behavior in firing of these colors.

Colors were not only put on in broad masses over portions of the design, but areas of the vessels were spattered with delicate tints of red, brown, and yellow, shaded from the edges toward the center with great taste. Areas of color were frequently stippled, apparently with the yucca brush, and sometimes color was applied using the end of the finger as a pounce. Masses of dark color were relieved or made more specific as to meaning by scratching away the color with a sharp point as in etching. In one example found at Kawaiokuh the representation of a mask is covered with raised work in color, the pigment having been thickened to form a mass. These examples, which probably do not comprise all the manipulations with which the Jettyto potters were familiar, are enough to place them in the category of the most advanced pueblo artists.

It must be said also that in drawing they take high rank in that they displayed an appreciation of the quality of lines and attacked complex subjects, which they rendered with accuracy, freedom, and boldness.

Their colors were applied by means of a slender strip of yucca leaf, as a rule, where accurate work was sought. In some cases, however, there is evidence that a larger, soft-ended brush, possibly of hair, was used, and the design painted on hurriedly and roughly. It is true that the pottery of any one of these pueblos furnishes examples showing varying degrees of skill, though the average is high for pottery of the better class.

AGE OF JETTYTO VALLEY RUINS.

It is fortunate that the dates of the discovery (1540) and of the destruction of Awatobi (1700) are known. From these dates it is possible to approximate the age of the related pueblos and to get a clue as to the period of the migrations from the Rio Grande. These migrations extend over a considerable length of time, but there is traditional material relating to all the settlements, portions of which have been collected by J. Walter Fewkes^a and A. M. Stephen.^b

Previous to the year 1700, when the last migration from the Rio Grande brought the Tewans of the present town of Hano, many clans from the east settled in Tusayan. One comparatively late migration was due to the unsettled conditions on the Rio Grande caused by the pueblo insurrection of 1680. These migrants founded the pueblos of Payupki and Tebungkihu, now in ruins near the East and Middle Mesas. They withdrew again to the Rio Grande at the instance of Padre Menchero when the trouble had passed.

The settlements at Sikyatki, Awatobi, and the other great Jettyto towns were more permanent and endured to all appearances for several centuries. The first Rio Grande migration undoubtedly antedates the conquest (1540); it may not be possible, however, to determine the length of time beyond that date that the Jettyto pueblos were occupied. In 1540, when Awatobi was visited by Tobar, it was a village of 800 souls, the only Hopi village besides Oraibi, then located on a mesa.^c Later visitors to Awatobi were Espejo, 1583; Oñate, 1598, and Vargas, 1692. In 1700 it was destroyed by Hopi from the pueblos a few miles to the north, having remained on its

^a In various reports of the Bureau of Ethnology, *American Anthropologist*, and *Folk Lore Journal*. Quite a full account may be found in the Seventeenth Annual Report of the Bureau of Ethnology, to which I am indebted. See also the recent paper on Tusayan migration traditions, Nineteenth Annual Report of the Bureau of Ethnology, 1901.

^b Eighth Annual Report of the Bureau of Ethnology, 1886-87.

^c J. W. Fewkes, Report, Smithsonian Institution, 1895.

location for one hundred and sixty years during the historic period, and inferentially having been built long before 1540. At that date, also, the three very large pueblos to the east of Awatobi, and also Sikyatki, had been abandoned, as Tobar makes no mention of them. This, of course, is negative evidence. It seems likely, therefore, that, as Dr. Fewkes has suggested, this migration probably occurred in the fifteenth century.

The impression the writer received on the study of these ruins is that Kawaiokuh^a and Chakpahu were contemporory with Awatobi. Like Sikyatki, they mark the period of the highest development of the potter's art in Tusayan. Kokopnyama, however, seems older; the pottery is not so good and it is possible that it is the first settlement in this region from the Rio Grande. The important clan of the Fire or Firewood is known to have lived at Tebungkihu and Sikyatki;^b it may be that Sikyatki was settled from Kokopnyama. The pottery of Chakpahu is the finest to be found in Tusayan. This pueblo was the center of the manufacture of the splendid napiform vases characteristic of this region, and innumerable beautiful fragments are to be seen in the débris. At Kokopnyama sherds of such vases are very few; at Kawaiokuh there are about as many as at Awatobi. The ruins of Sikyatki have furnished some fine examples, figured in Dr. Fewkes's monograph.^b

One of the most beautiful specimens in existence, taken out by an Indian at Chakpahu, was secured by Mr. P. G. Gates in 1901.

If there were no traditions among the Hopi relating to the five pueblos mentioned, comparative methods would show that the bold symbolism on the pottery relates them to the Keresan pueblos, which furnish the only ware among the present village dwellers that is similar in style of ornamentation. We may conclude, therefore, that superior ceramics, both in texture and decoration, were brought to the Hopi from the east as early as the fifteenth century.

The main feature of interest in this connection is the extent to which the Hopi culture has been modified by that of the Rio Grande peoples. The region of the upper Rio Grande, with its superior advantages as to food supply, due to the abundant water, has been the cradle of pueblo culture, and to these favorable conditions, as well as its position on migration lines, it may have received the first settlements of hunter tribes forced into the pueblo region. Undoubtedly these conditions have determined the perpetuation of the majority of the existing pueblos. From this region we would expect various populations to swarm in search of new homes. The Navaho also were modified for their betterment by contact with the Rio Grande culture and by racial

^a Mr. F. W. Hodge informs me that this is also the Keresan or Queres name of the pueblo of Laguna.

^b Seventeenth Annual Report of the Bureau of Ethnology, Pt. 2.

mixture with some of the clans, through whom, no doubt, they received sheep and their first lessons in pecudiculture.^a

The original Hopi clans, the Snake and Bear, forming the nucleus of the settlement, traditionally came to Tusayan from the northwest and southwest at an early date, possibly as early as the fourteenth century. This marks the end of the wanderings of those clans, the location having many permanent springs and the stream beds giving fair opportunity for agriculture. It is not the country that civilized man would choose for a habitation, but to the Indian its isolation gave safety and the desert gave subsistence to those who knew the field craft for the desert.

There can scarcely be more than conjecture as to the origin of these early clans. From the language they were of the great Uto-Aztecan stock, which forms at this day the largest linguistic family on the Western Hemisphere. The history of this family is comprised in less than four centuries since the conquest, and tradition in Mexico, where the tribes reached their greatest efflorescence, places their migration from the north at two centuries before the conquest. Cubas places the first "king" at 1352.

There is little doubt that before the date of the entrance of the Aztecs into Mexico the Pueblo region possessed its characteristic culture. Whether this culture was environmental (Brinton) or an outer wave from the great ancient cultures of Central America, or both, is an open question.

The Shoshoneans, like the Navaho, came in contact and union with pueblo tribes at one of the early centers of population, presumably in southeastern Utah or northern New Mexico. Here they received a modifying element assimilating them to pueblo culture. It might not be going too far to say that Nahuatl incursions into Mexico from the north were filtered through the Pueblo region; indeed it seems probable. The Hopi, then in their beginnings, may be regarded as a product of pueblo environment and culture upon hunting tribes of Shoshoneans whose virility fitted them to move about in the Pueblo region, preserving their organization and language. If it be true that the early tribes did not possess corn, but depended upon the chase, the most important, in fact a well-nigh essential, need was supplied by this food of foods, and the modifying effect was like that of the acquisition of sheep by the Navaho. Contact of the Hopi with cliff-dwelling tribes of Pueblo Indians is undoubted; the traditions hint at it, and the discoveries of George H. Pepper in northern New Mexico reveal basket-making tribes using symbolism familiar among the Hopi.^b In truth

^aF. W. Hodge. The early Navajo and Apache, *American Anthropologist*, VIII, 1895, p. 223.

^bThe Ancient Basket-Makers of Southeastern Utah, G. H. Pepper, *Journal of the American Museum of Natural History*, New York, II, Supplement, April, 1902.

it might be said that we have in the ancient inhabitants of Grand Gulch the Shoshonean prototype of the northern clans of the Hopi, or rather one of these clans in a state of modification as referred to.

The subsequent history of the Hopi after the Snake and other early clans settled in Tusayan is marked by the arrival of many clans from various quarters, consolidating into the Hopi complex as we find it to-day.

The more important of these superadded elements were the Rain, Lizard, and Rabbit groups of clans from the south, according to Dr. Fewkes, which have been traced at Homolobi and Biddahoochee, and the Badger, Horn, Tansy Mustard, and Katchina groups of clans from the east.

Attention is called in this connection to an interesting environmental phase of the names of the clans, which seems to work out beautifully in determining the location from whence they came. This is that the clans coming from the north and northeast, from mountainous regions where game abounds, bear the names of animals; while those from the south, or from less rugged and more cultivable regions, bear the names of plants, minor animals, or of the beneficent powers of nature. The clans from the land of the agave and the yucca palms lived in a milder environment and by the nature of things were more civilized than the clans who were forced to depend largely on hunting for subsistence. It will be seen that those facts must be taken in account in the study of the composition of the Hopi.

REMARKS.

TYPES OF BUILDINGS.

It was found that in few of the pueblos south of the Jettyto Valley examined by the Museum-Gates party of 1901 was there any care taken to locate in an inaccessible or defensible position. The care was rather to settle near the water supply, at a sufficient elevation merely to overlook the fields or to furnish a practicable site.

As a rule, the plans of the fifty-five ruins examined are of the ordinary rectangular type, offering little worthy of remark. The groups in the White Mountain region, however, which show in part circular plans, and some of the ruins of the Canyon Butte group, which approach this type, are interesting in connection with the range and affiliations of the widespread clans who employed a style of decoration on gray and red pottery that may be called the dual style, which will be discussed later (p. 354).

DISTRIBUTION OF PUEBLO CULTURE.

Last winter the writer presented a paper before the Anthropological Society of Washington, giving a summary of the field work of the

Museum-Gates expedition of 1901. In discussing the paper President W. H. Holmes characterized the Pueblo culture by saying that it was a great unit with much diversity in detail, fading off into but not connecting with the areas to the west, north, and east, save perhaps in case of a limited class of ancient earthenware decorated with color found in the States of Mississippi, Arkansas, and Louisiana; but on the south there is strong evidence that it connects with the art of northern Mexico and to some degree with the great culture centers of the southern plateau of Mexico. President Holmes said that the various ceramic groups were largely the result of local environment, and to some extent to the culture of peoples arriving in that environment, but the culture over the whole Pueblo area has been to some extent unified.

A few years ago the writer made a study of the art of pottery making carried on at the pueblo of Hano, on the first or east Hopi mesa. It was strikingly brought out in the course of this study that the environment for potter's materials is quite extended. For instance, one desirable clay was brought from the ancient quarry of Sikyatki, about 5 miles away, another from 10 miles or so, common clay from the partings in the mesa just below the pueblo, another clay of different character from some other place, and besides these four varieties, kaolin was brought from a long distance. Experiments were also made with clays encountered during journeys, and by mixtures clays were improved or regulated for certain classes of ware, as for the large water ollas which come from the primitive kiln a reddish-brown color. A similar discriminative selection was also observed in regard to the pottery pigments.

It will be seen that the potter's art at Hano is surprisingly complex in the matter of materials, not to speak of the other processes involved before the ware is finished.

So far as has been observed by the writer, the clays of this region as a rule burn to light yellow, or, in other words, it is an environment that would determine yellow pottery. Without doubt the three great types of pottery of the Pueblo region as to color have their origin in the geological environment in localities where the respective conditions obtain, but the decorated ware such as is taken from the ruins and exhibited in our museums stands very far from the beginning. These types have been more or less widely spread over the whole Southwest through the migration of clans. Thus we find gray ware almost exclusively, for instance, at the Scorse Ranch, where the country clays burn from yellow brown to light yellow. Hence kaolinic clays were sought out for use here because gray pottery was the kind sanctioned by custom and must be made even though the end be attained by passing a wash of kaolin over a body of dark color. It seems, therefore, that there is evidence of strong conservatism in the potter's art of the pueblos,

one which peculiarly belongs to the woman, who Professor O. T. Mason has shown are the originators and zealous perpetuators of many of the primitive arts. While without the evidence of the decorative symbolism and forms of pottery and that of other artifacts found in a ruin, it might not be thought advisable to depend on the color of the ware alone; yet, bearing in mind the strong conservatism of custom, this feature has classificatory value. Speaking now with regard to the art alone, we may provisionally class the pueblo culture in presumable sequence of origin as that of the gray-ware people, the yellow-ware people, and the red-ware people.

The region of gray ware is southern Utah, southern Colorado, northern Arizona, and northern New Mexico, and its range is much more extensive than that of any other class. The surviving people making gray ware are the Zuñi.

The region of yellow ware embraces the Hopi Reservation and the country south to the Lower Gila in the former range of the Hopi; in the southern portion of the region it occurs sparingly and crosses areas of red and gray. Acoma, Sia, and perhaps some other Rio Grande pueblos make ware which falls in this class.

Ancient sites furnishing red ware exclusively are rare. Red ware occurs in connection with gray, polychrome, and other classes. In general, the region embraces the White and Mogollon mountains, portions of the Gila, and has its focus in the Pima-Papago-Mohave country in southern Arizona.

RANGE OF DUAL DESIGN ON POTTERY.

In this connection attention is called to a style of decoration found almost altogether on gray pottery. The design is drawn in hachure and solid color; these areas of decoration being very often complementary, suggesting the idea of duality. (See Plate 31, figs. 3 and 4; Plate 32, figs. 5 and 6, Scorse Ranch ruins, and Plate 51, Canyon Butte Wash ruins.) This design may be seen on the palaces of Mitla, where it occurs in the frets figured by W. H. Holmes.^a It is believed that this style of decoration may be of importance in determining the range and affiliations of the tribes making use of it. An examination of the pottery of the existing pueblos shows that the dual or hachure design has been perpetuated only at Zuñi, and here also on the surviving representative of the ancient gray ware, still the typical pottery at Zuñi. The ruins of the Zuñi pueblos which flourished at the time of the conquest and the Zuñi ruin of Kintiel, so far as we have observations upon them, show this type of ware and decoration. The ruins south of Zuñi to the Rito Quemado; southwest, embracing the St. Johns-Springerville

^aArchaeological Studies Among the Ancient Cities of Mexico, Field Columbian Museum, Anthropological Series, I, No. 1, Chicago, 1897, pp. 248-249.

region; Forestdale (see p. 289), in the Apache Reservation; the Tule-rosa and Upper San Francisco rivers, etc.; in general, the region south and southwest of Zuñi, with as yet undefined boundaries but manifestly an area of great extent, are of this class. As said by Cushing, the traditions clearly show that the Zuñi stock is made up of two elements, the one preponderating and more virile from the north, and the other from the south, which Cushing seems inclined to connect with the Yuman of the Lower Rio Colorado or the Piman stock.^a It may be said in passing that a census of the immense collection of modern Zuñi pottery in the U. S. National Museum includes a number of pieces of red ware, principally in form of bowls with polished surface, which remind one strongly of Pima pottery.

Little work has been done on Zuñi archeology, nor is the pueblo unique in this respect; so that the starting points, ancient migration lines, or stopping places on the way from the north or south are yet to be worked out. Perhaps this hint as to the dual and hachure design may serve as a clew in the further prosecution of this research, which presents only one of many problems that await elucidation in that fascinating field, the ancient Southwest.

SYMBOLISM.

There remains also much work to be done on the subject of symbolism, and like many other matters connected with the Indians, who are daily losing something of their old life, the time for this study is the present.

A world of symbolism painted on pottery lies beneath the ancient ruins of Arizona, besides that which has already been taken out by responsible and irresponsible parties. Nowhere has symbolism played such important part as in the pueblos of the Hopi group, and nowhere is the study of them so interesting, both on account of the fullness of the material and the relationship to existing peoples who to-day have a living body of symbols. Here is an advantage presented in the study of pueblo archeology over that of other regions in the United States. Representatives of the prehistoric peoples are still living in the region where the ancient clans wandered, preserving in some degree the ancient thought and in less degree the ancient arts. To them we may refer the finds taken from the ground with some reasonable hope of explaining obscure points or of finding clues that will lead to the explanation, whereas in other regions there are many problems that can receive no aid from living tribes.

Nowhere on this continent is there found a greater wealth of symbolism than in the region of the Hopi mesas, among the living as well as among the dead. The expression of this symbolism is also of an

^aThirteenth Annual Report of the Bureau of American Ethnology, 1891-92, p. 342.

interesting stage, that of transition from the realistic to the idealistic, and various degrees of growth exhibiting examples of the origin of symbols and their submergence into conventional and geometric forms. The beginning, range, and decay of symbols, as well as the subjects involved, form a fascinating chapter in the history of this region, a history that gives, beyond all in importance, a clew to the thoughts of the pueblo dwellers.

It is hoped in a future paper to present an account of the symbols occurring on objects collected in different localities by the Museum-Gates expedition of 1901, in order to illustrate some of the points mentioned above. The whole subject is too large for the efforts of one person, and perhaps rendering the material accessible to students may be the most valuable result accomplished in this instance. A few of the best specimens showing symbolism are figured on Plates 98 to 101.

DOMESTIC AND FOOD ANIMALS.

A careful search for the bones of animals was maintained in the excavations made in and around the sites examined during the season of 1901.^a This inquiry was pursued in order to ascertain what animals were used for food and what animals were domesticated by the ancient inhabitants of this region.

As to the first item, the remains show that most of the animals of the region were consumed as food; but, as might be anticipated, bones of the carnivora are much rarer than those of the herbivora, the latter represented by deer and rabbit species, and the former by the fox, coyote, wolf, dog, raccoon, badger, wildcat, and puma, but no bones of the bear were observed. Remains of the beaver and small rodents, and bones of birds, especially the turkey, eagle, hawk, and owl, were noted.

Remains of the dog and turkey were found in nearly every ruin, showing the extent of the domestication of these animals in this region. So far as can be determined, the dog and turkey were the only animals domesticated by the pueblo tribes. It was hoped that light might have been thrown upon the question of domestication of other animals, namely, the deer,^b and an auchenia (llama), as affirmed by Cushing from figurines found on the Rio Salado, in southern Arizona.^c The writer

^a Work of this character was begun in 1896, on the Homolobi ruins, and continued in 1897 in connection with environmental studies in the Southwest. See Hough, *Environmental Interrelations in Arizona*; *American Anthropologist*, XI, May, 1898, p. 133; and J. W. Fewkes, *Twentieth Annual Report of the Bureau of American Ethnology*.

^b Nadaillac, *Prehistoric America*, London, 1885, pp. 205, 219, affirms the domestication of the deer in Colorado and Arizona.

^c See Dr. Washington Matthews, U. S. A. in *Land of Sunshine* (now *Out West*), XII, March, 1900.

has copied numerous pictographs in the valley of the Little Colorado River showing unmistakably the herding of turkeys and of deer by men. It is possible that the scene depicted in the bowl found at Linden (Plate 19) is of this character. In this connection the congeries of small cells adjoining the ruins at Pinedale, in the White Mountains of Arizona, is interesting. Still, the evidence presented so far as to the domestication of other animals than the dog and turkey is unsatisfactory.

It is hoped that in future excavations in the Southwest all bones of animals may be carefully collected for the sake of the aid they afford to a fuller understanding of the life of the pueblo dwellers.

PRESERVATION OF ANCIENT RUINS.

One of the most depressing features connected with the work in the Pueblo region is the evidence of vandalism and unskilled exploration encountered on almost all of the prehistoric sites. The extent of this devastation can scarcely be realized. No ruin is so obscure or inaccessible that some sheep herder or prospector has not put in some of his tedious hours digging in it.

The settlers of the States and Territories in the Pueblo region from the first were alive to the wonders of the new country and were attracted by the evidences of the former inhabitants. Thus at that time, out of curiosity, many of the ruins were visited; axes, etc., were picked up from the surface, and perhaps a little cursory excavation done, the specimens secured forming household ornaments.

Later, the various governmental explorations called widespread attention to the ruined pueblos of the Southwest, and soon it was found that relics from these pueblos had commercial value. With this enterprising wedge, the collecting of "relics" became a business, and men traversed the region for the sole purpose of tearing up the ruins for their private gains. Almost every trader either employed Indians to dig or bought all the specimens that Indians brought in at a nominal price, and many were the men who had "collections" for sale. A few of these individuals, profiting by the scientific methods of governmental and institutional explorations, were careful to catalogue and localize the specimens as far as possible at second hand, finding that such data increased the value. To give an idea of the extent of this vandalism and unscientific collection, it may be said that from one town alone during the past ten years about 20,000 specimens have been shipped; from other neighboring towns, about 7,000 specimens. From the same points during this period about 10,000 specimens have been shipped by scientific exploring parties. The speculative collecting was from Indian reservations, railroad and Government lands.

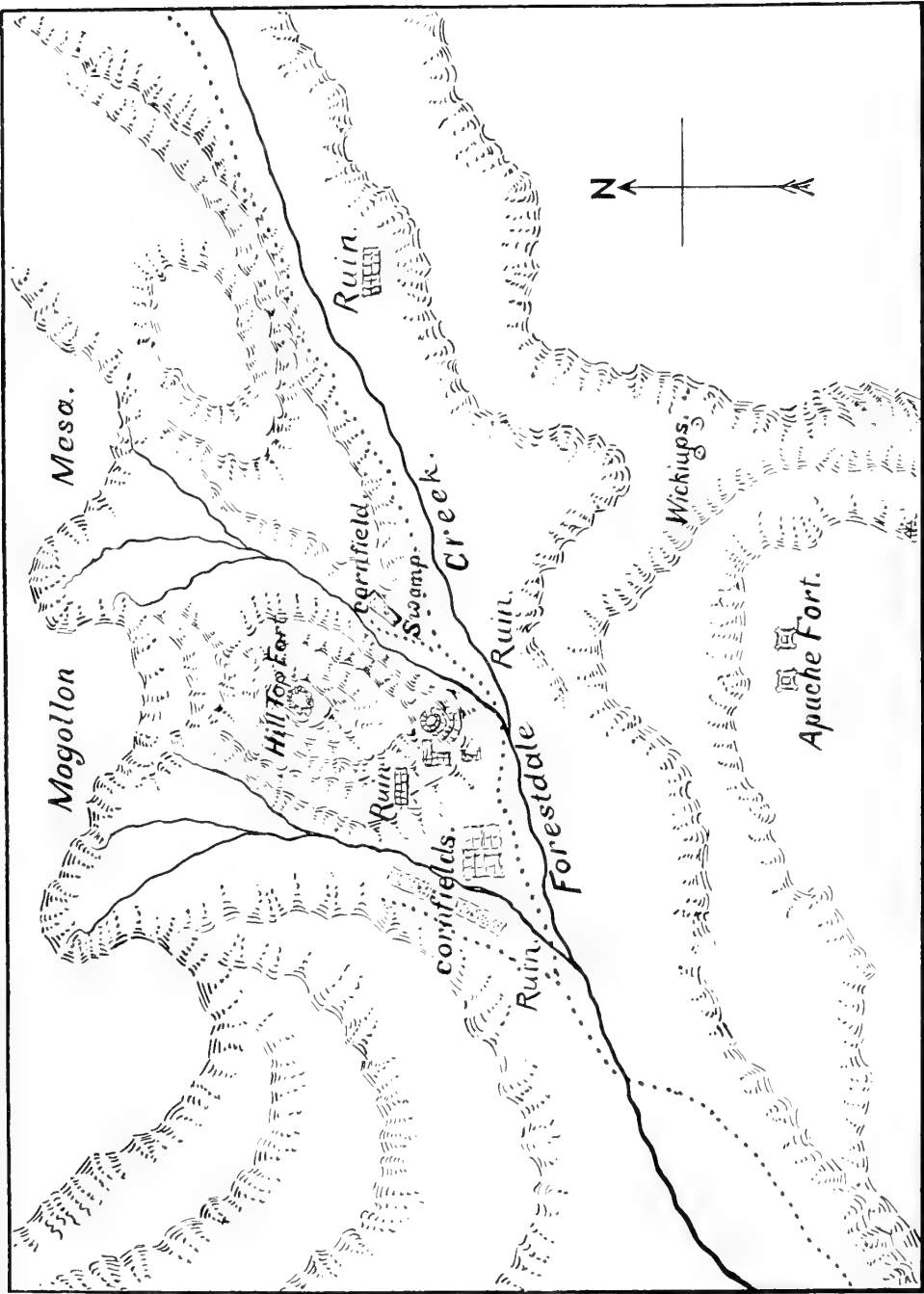
These facts have been known for some time, and a bill for the preservation of ancient ruins has been before Congress several terms, but the bill has not been enacted into law. Indirectly, however, Congress has worked for the preservation of the ruins by reservations of public domain, and in a notable instance has preserved the famous ruin called Casa Grande.

In this connection the Interior Department has done yeoman service in hindering, if not preventing, further despoiling of the ruins on governmental lands by instructions to its agents and by sending inspectors into the field for the purpose of warning offenders.

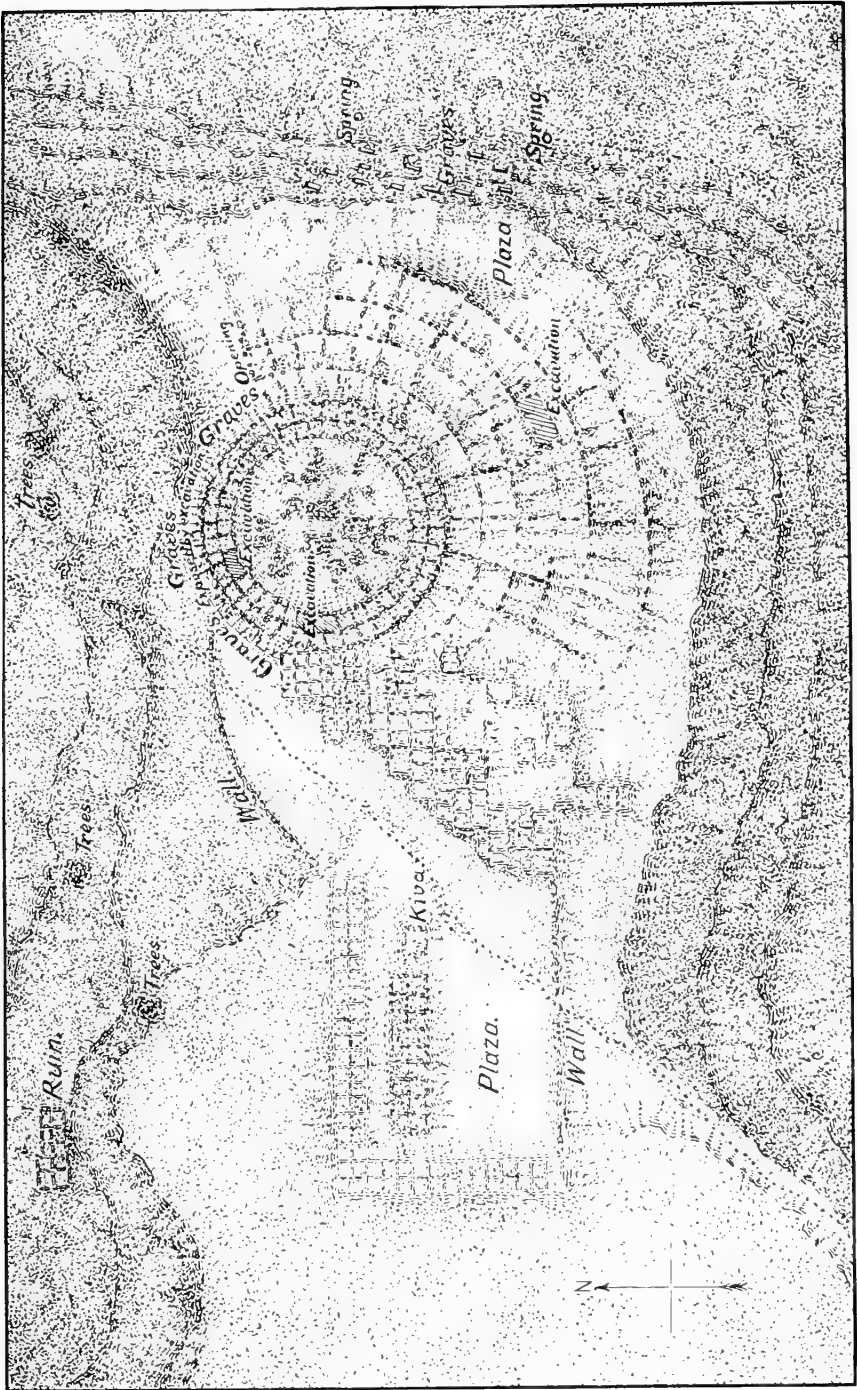
That there was a sentiment among some of the people of the Southwest in favor of the preservation of the ruins is shown by sundry actions taken by legislative bodies and the formation of societies with such end in view. The legislature of Arizona took action some years ago without apparent success. The Arizona Antiquarian Society founded through the efforts of the late Dr. Joshua Miller, of Prescott, endeavors to preserve and to prevent the despoiling of sites of antiquarian interest in the Territory. In New Mexico also the subject is receiving considerable attention.

SUMMARY OF WORK.

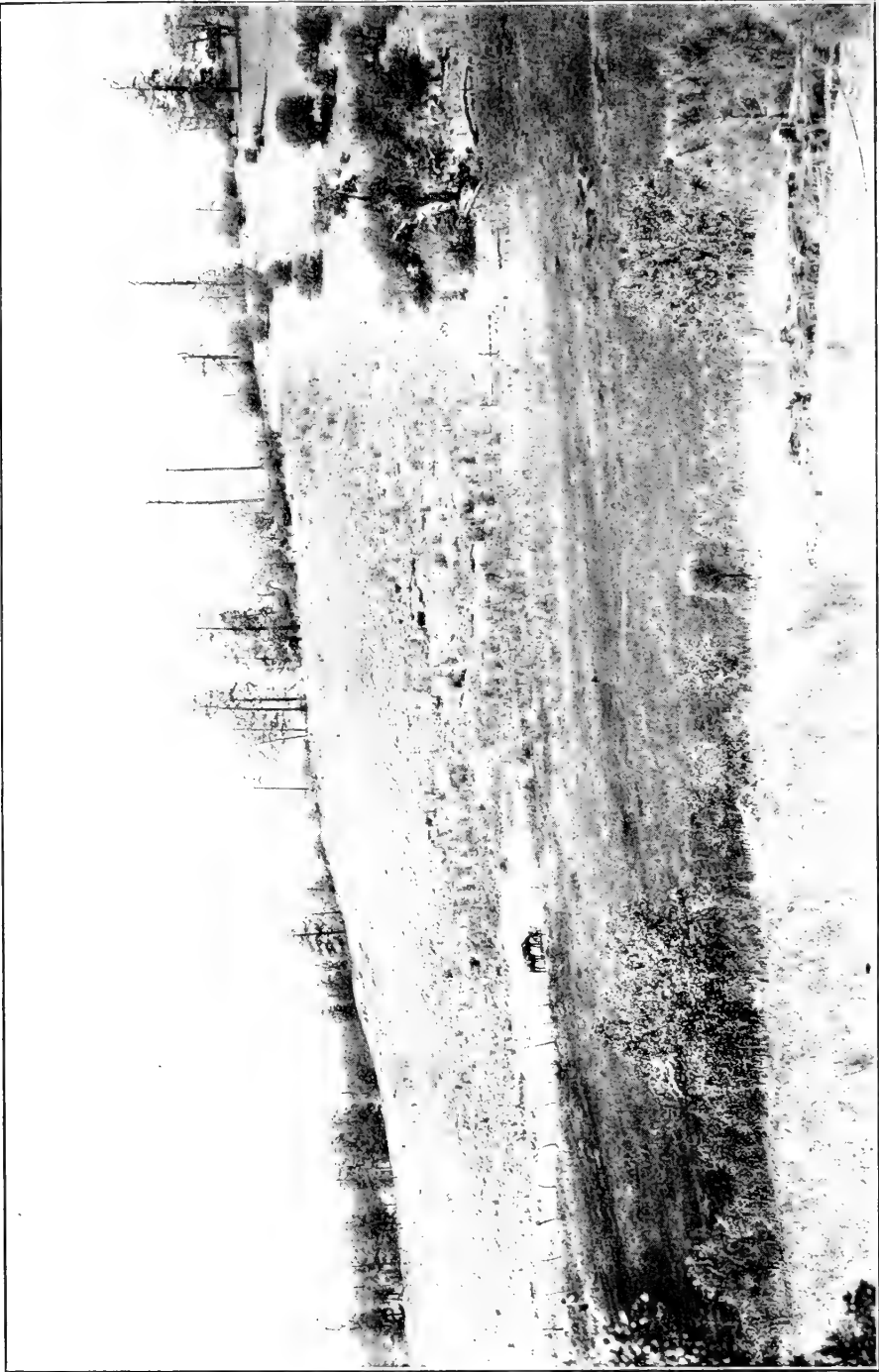
During the season over 55 ruins were visited, and 18 of these were excavated in a region nearly 200 miles north and south by 70 miles east and west. Some idea of the difficulties encountered, aside from 800 miles of wagon travel, may be gathered when it is known that five of the groups required dry camps, water being hauled considerable distances. The work, however, was quite successful, 2,500 specimens having been collected. In connection with this work, ethnological photographs, data, and specimens were secured from the Apache, Navaho, and Hopi Indians.



SKETCH MAP OF FORESTDALE RUINS.



PLAN OF TUNDASTUSA RUIN.
Forestdale, Arizona.



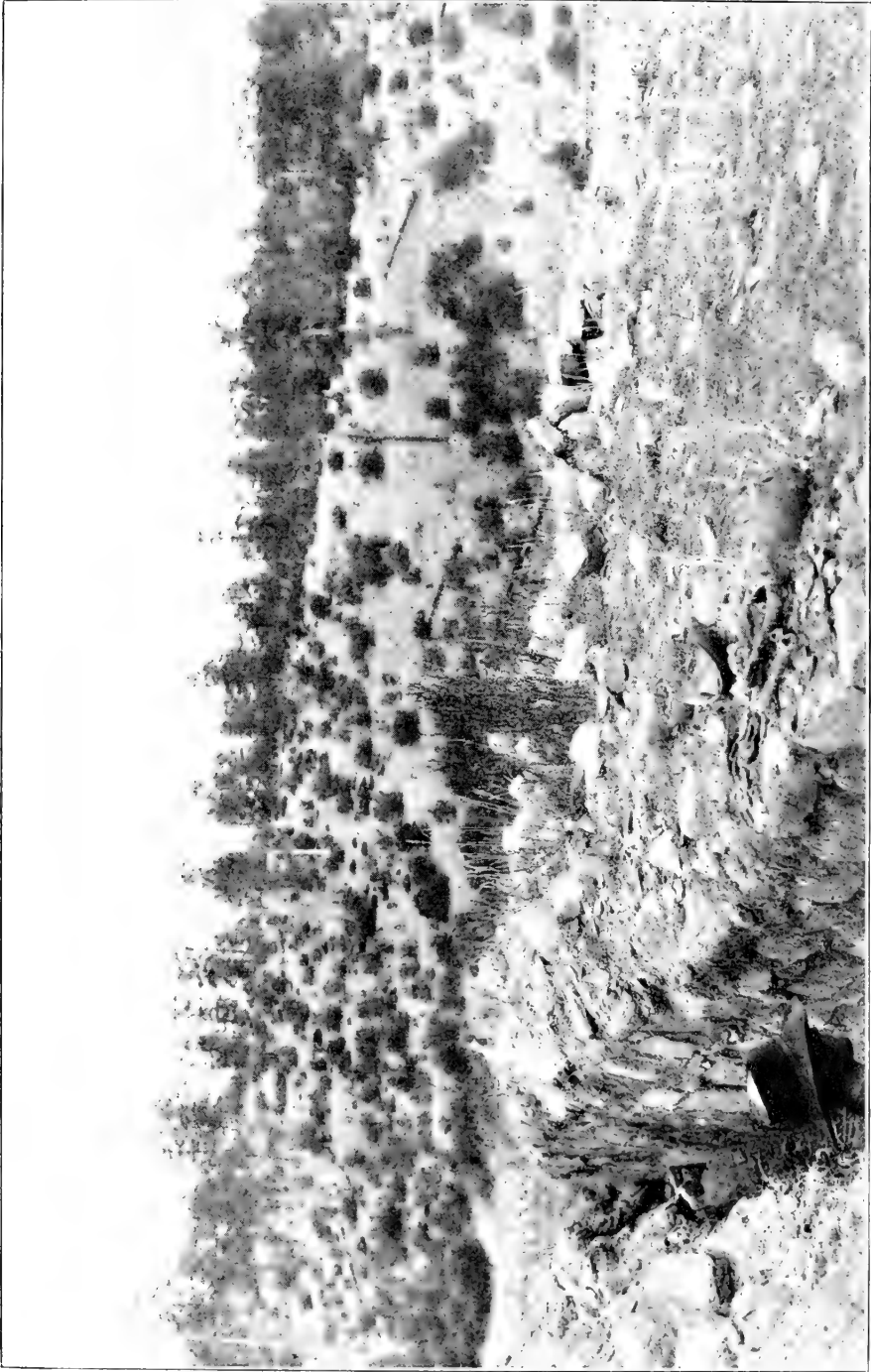
GENERAL VIEW OF TUNDASTUSA RUIN.
Forestdale, Arizona.



VIEW OF KIVA.
Forestdale, Arizona.



VIEW ON ACROPOLIS.
Forestdale, Arizona.

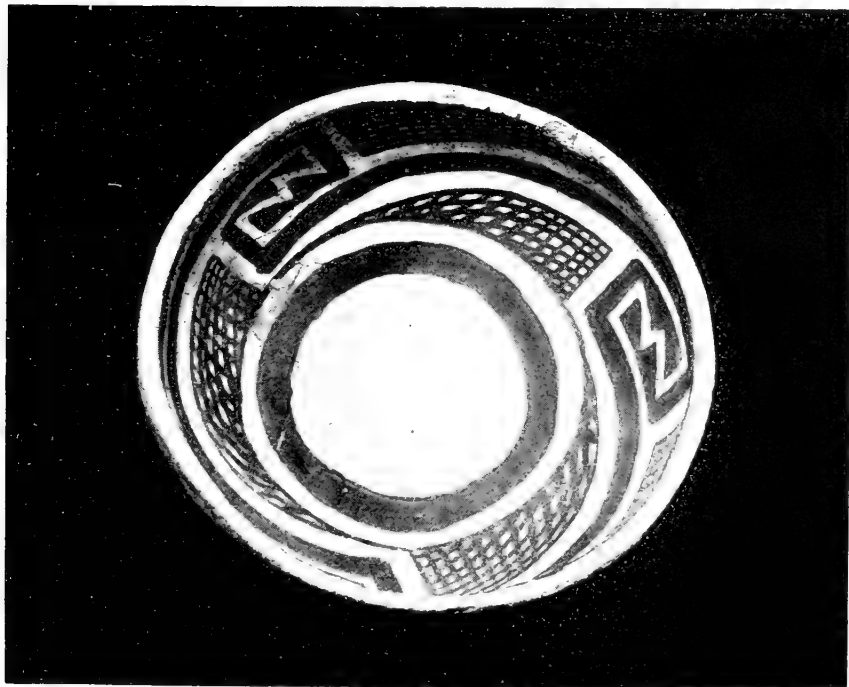


VIEW OF WALL OF ACROPOLIS.
Forestburg, Arizona



Length, 5½ in.; width, 4½ in.; height, 3 in.

Cat. No. 212830.

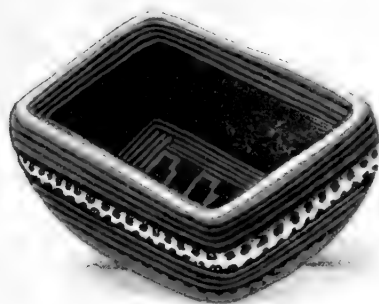


Diam., 5¼ in.; height, 2¼ in.

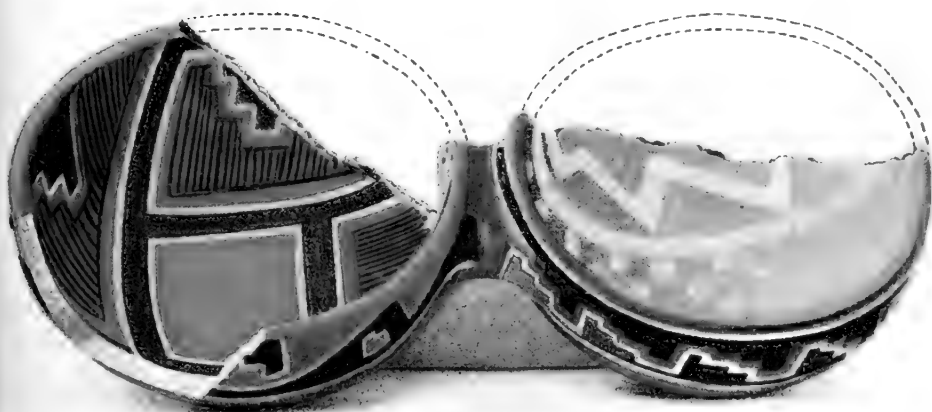
Cat. No. 212831.

BIRD-FORM MORTUARY VASE AND BOWL.

Forestdale, Arizona.



LENGTH, $2\frac{5}{8}$ IN. WIDTH, $1\frac{7}{8}$ IN. HEIGHT, $1\frac{1}{4}$ IN. CAT. No. 212841



LENGTH, $9\frac{3}{4}$ IN. HEIGHT, $2\frac{1}{2}$ IN. CAT. No. 212837

PAINT CUP AND DOUBLE BOWL.
Forestdale, Arizona.

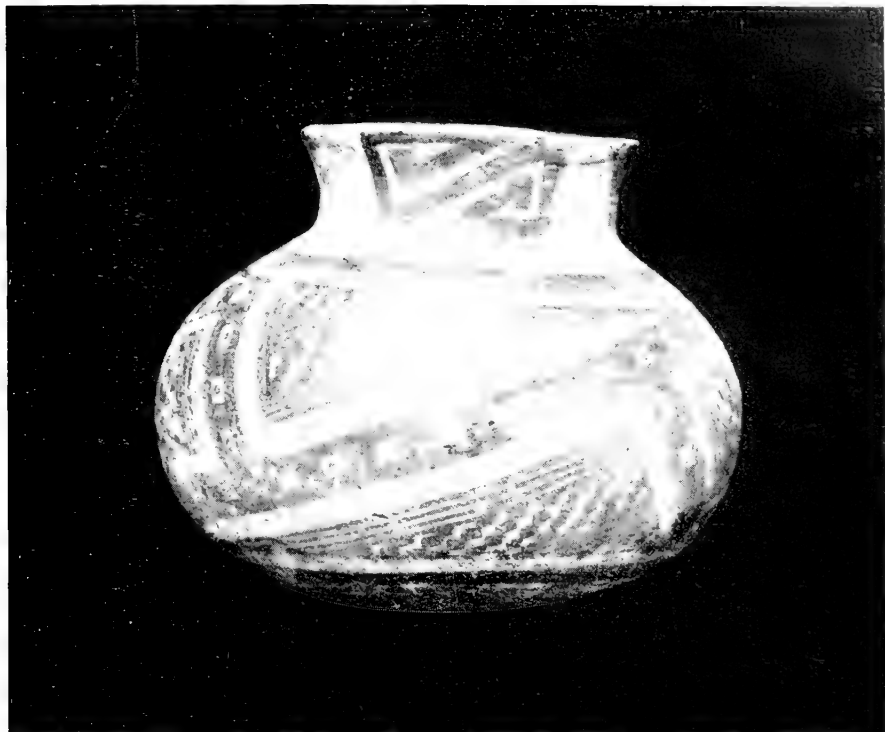


DIAM. $5\frac{1}{2}$ IN. HEIGHT, $2\frac{1}{2}$ IN. CAT No. 212834



DIAM. $5\frac{5}{8}$ IN HEIGHT, 5 IN. CAT. No. 213094

BOWL OF GILA TYPE AND HANDLED VASE.
Forestdale, Arizona.



Diam., 6½ in.; height, 5½ in. Cat. No. 212837.

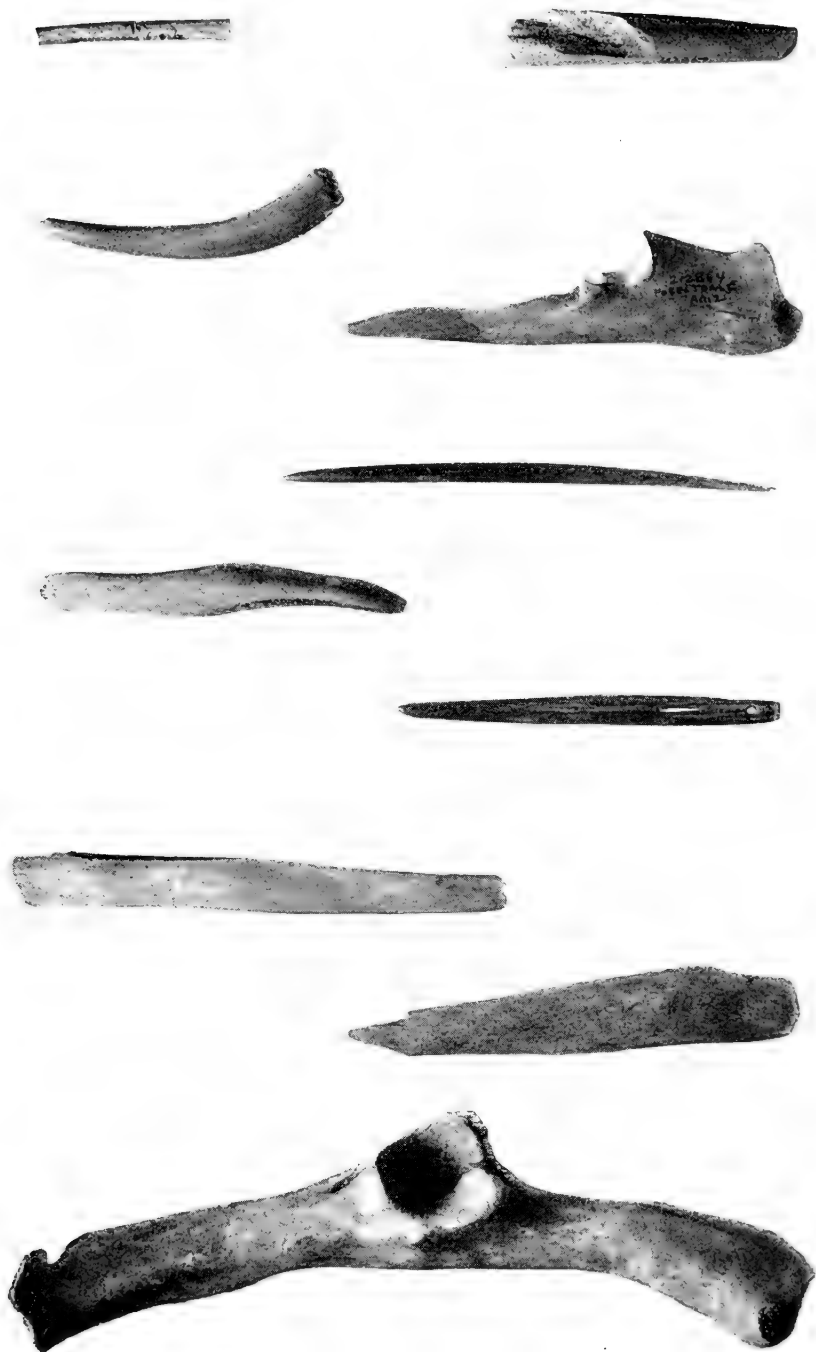


Diam., 10½ in.; height, 7½ in. Cat. No. 212828.

MORTUARY VASES OF GRAY WARE.
Forestdale, Arizona.



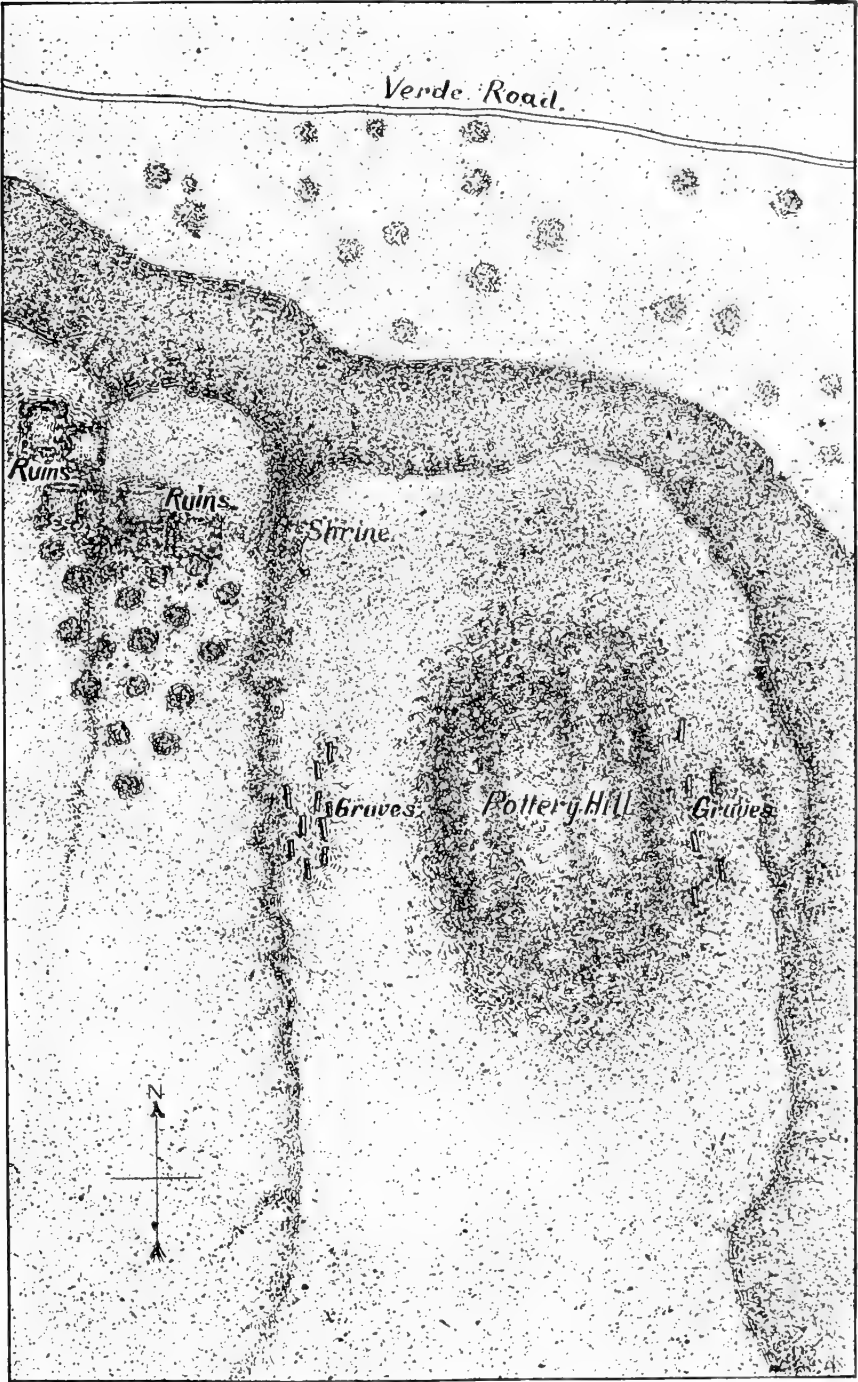
FETICHES OF POTTERY AND STONE, AND SCRAPERS.
Forestdale, Arizona.



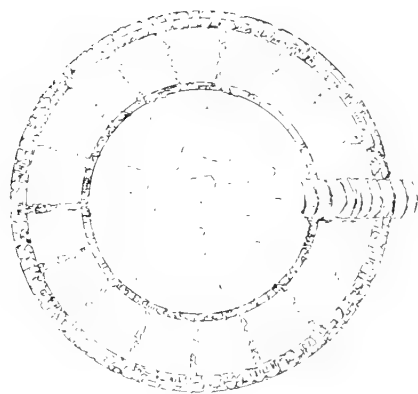
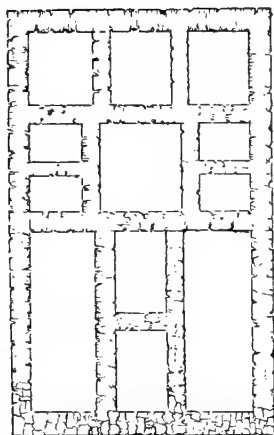
BONE IMPLEMENTS.
Forestdale, Arizona.



STONE AND BONE IMPLEMENTS
Interior Sawmill, Arizona.



PLAN OF POTTERY HILL RUIN.
Linden, Arizona.



PLAN OF SMALLER RUIN NEAR LINDEN.

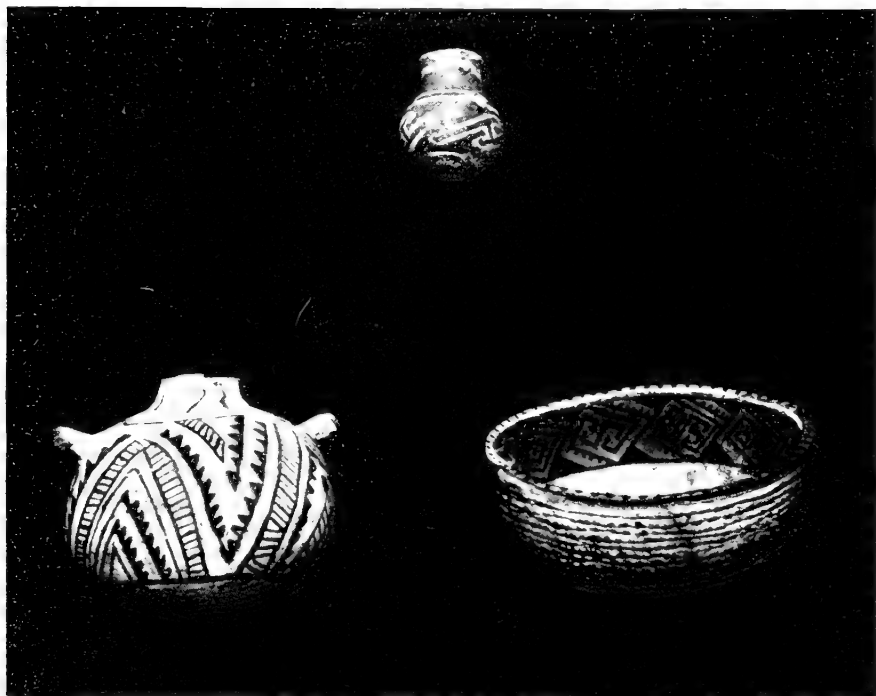
Arizona.



CIRCULAR PORTION OF SMALL RUIN NEAR LINDEN.



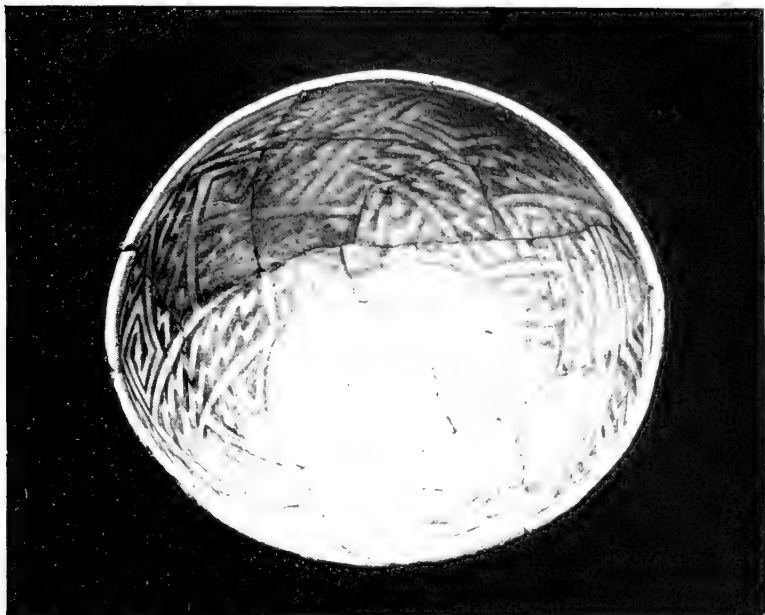
Diam., $5\frac{1}{4}$ in.; height, $5\frac{1}{4}$ in. Cat. No. 212978.
 Diam., $6\frac{1}{4}$ in.; height, 6 in. Cat. No. 212977.



Diam., $1\frac{1}{2}$ in.; height, $2\frac{1}{4}$ in. Cat. No. 212979.
 Diam., $5\frac{1}{4}$ in.; height, $4\frac{1}{4}$ in. Cat. No. 212891.
 Diam., $5\frac{1}{4}$ in.; height, $2\frac{1}{4}$ in. Cat. No. 212898.

GRAY WARE.

Linden, Arizona.



Diam., 9½ in.; height, 5½ in. Cat. No. 212988.



Diam., 8½ in.; height, 4½ in. Cat. No. 212929.

BOWLS OF GRAY WARE.

Linden, Arizona



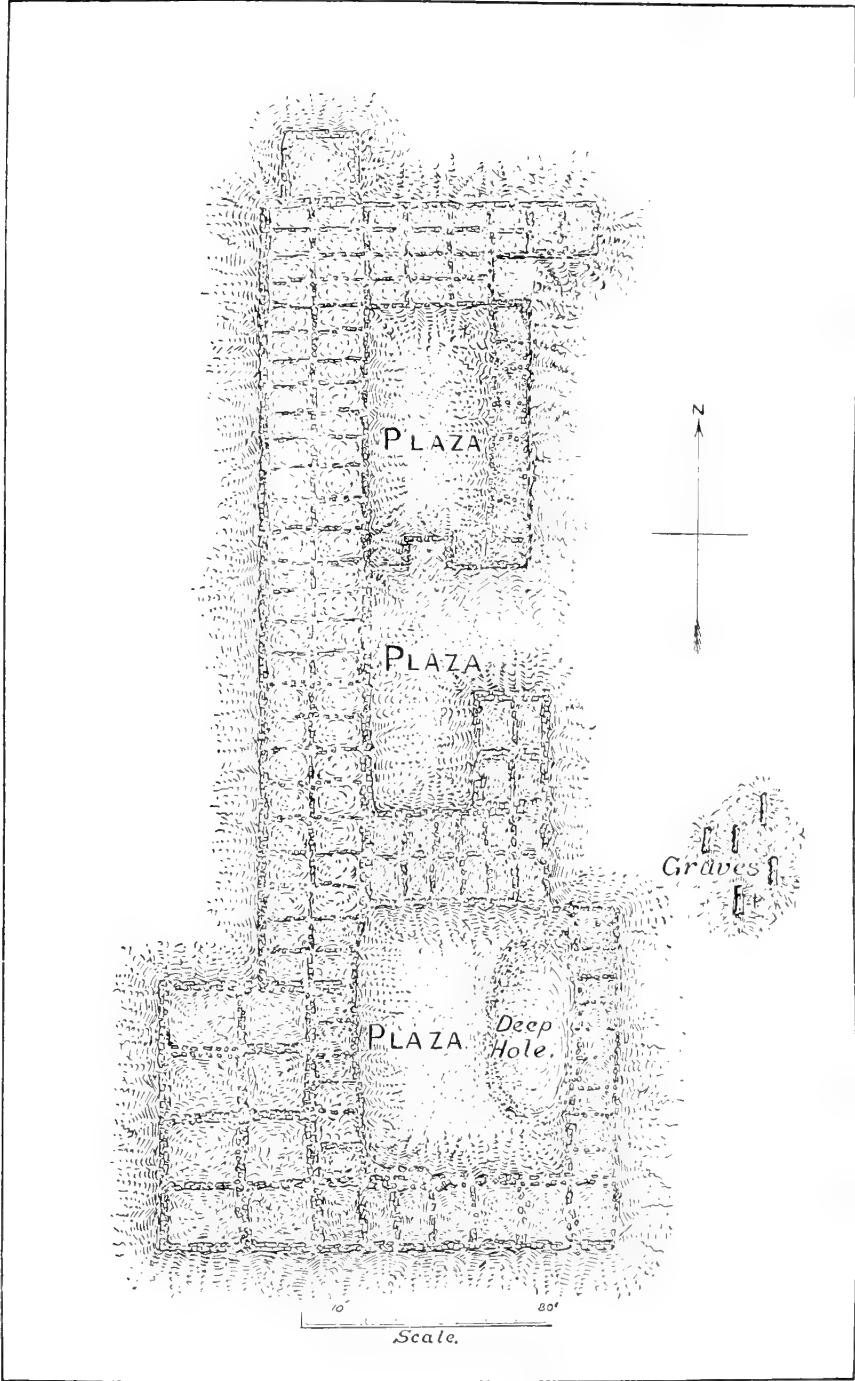
Fig. 1. Height 3 in. Dia. 2 in. No. 2895



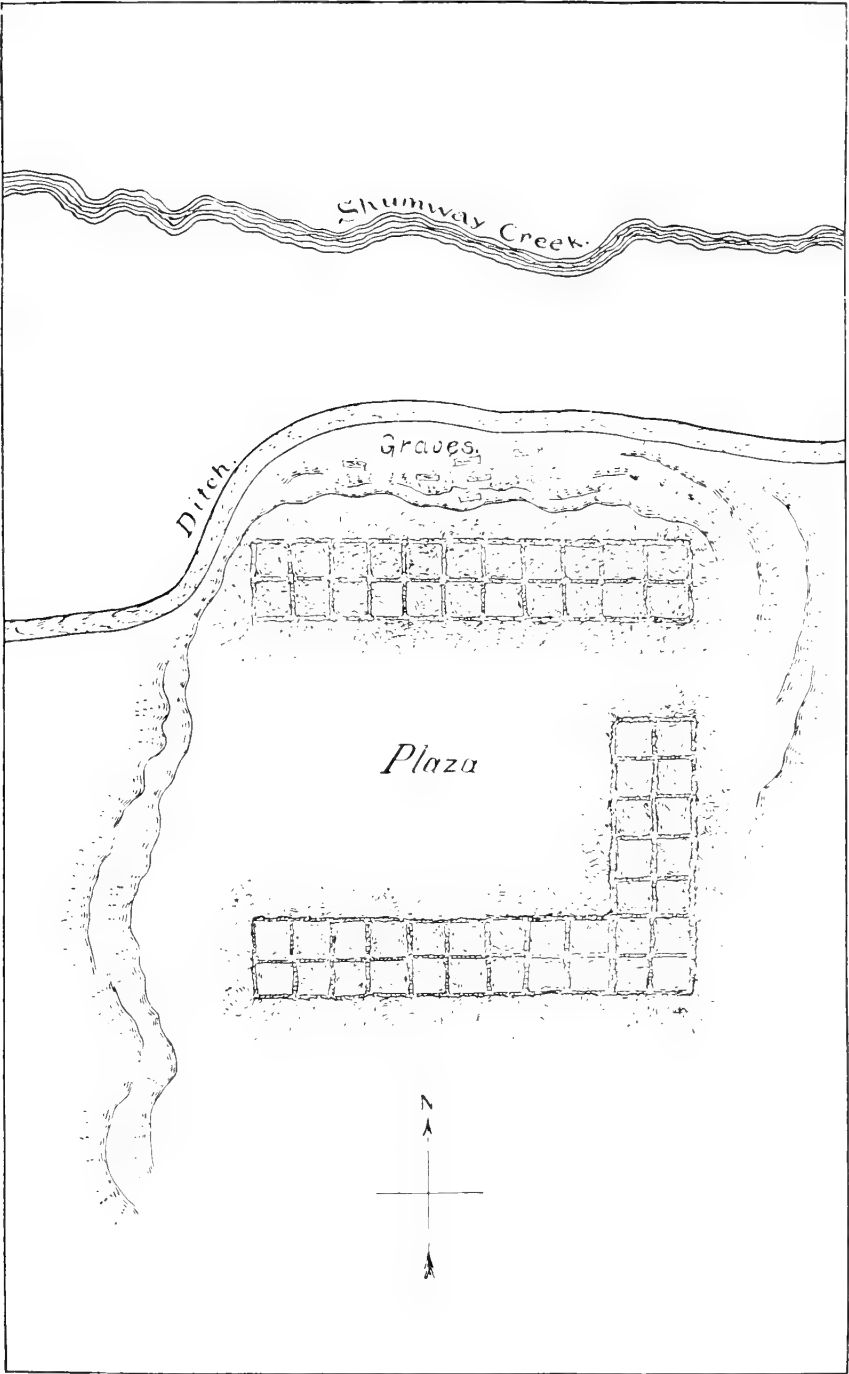
Fig. 2. Height 4 in. Dia. 3 in. No. 2896

THESE ARE A TYPE OF CERAMIC POTTERY

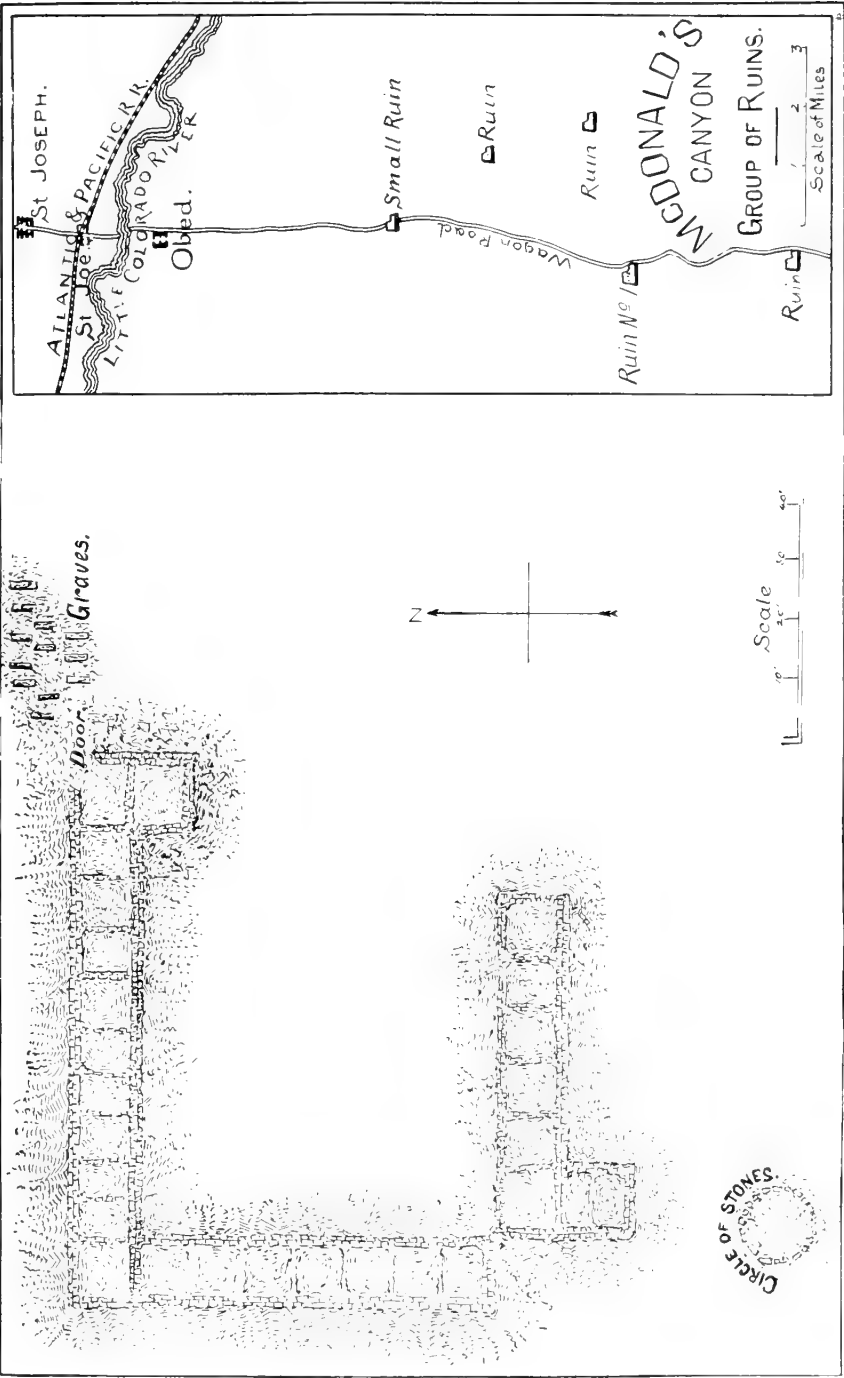
FOUND IN THE MEXICAN DESERT



PLAN OF HUNING RUIN.
Showlow, Arizona.

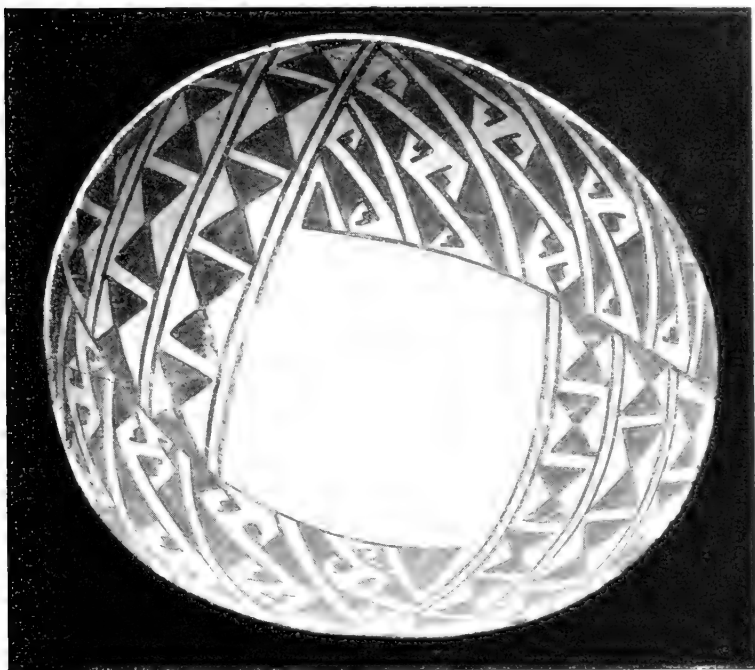


PLAN OF SHUMWAY RUIN.
ARIZONA.



PLAN OF RUIN.

McDonald's Canyon, Arizona.

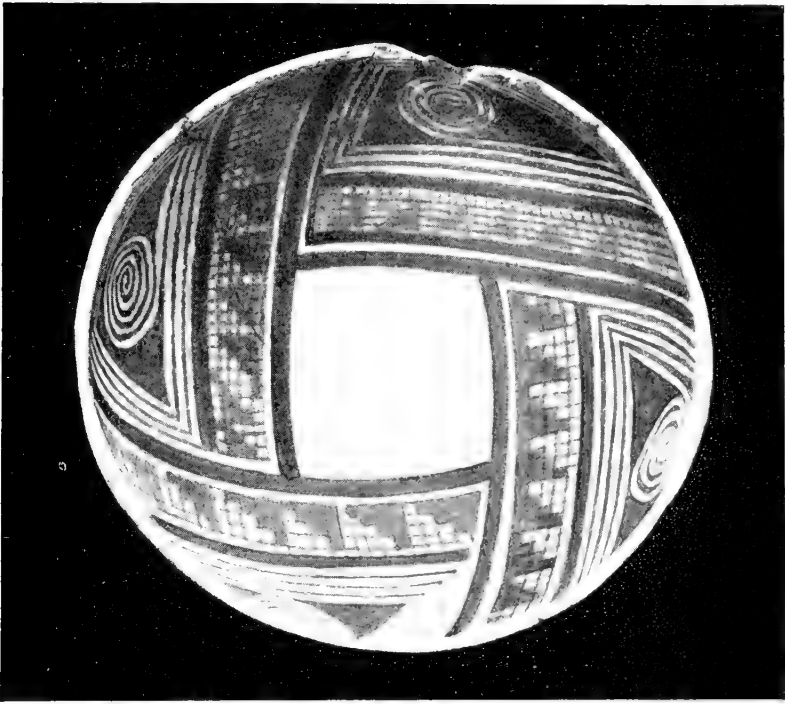


Diam., 13 in.; height, 5 $\frac{1}{4}$ in. Cat. No. 211963.

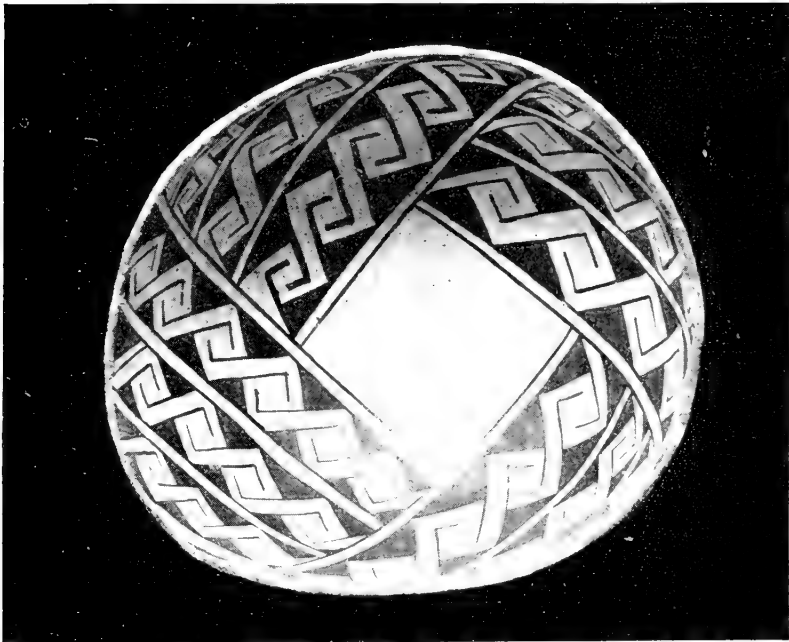


Diam., 13 in.; height, 6 $\frac{1}{2}$ in. Cat. No. 212260.

BOWLS OF GRAY WARE
McDonald's Canyon, Arizona.



Diam., $10\frac{1}{2}$ in. height, $5\frac{1}{2}$ in. Cat. No. 212265.



Diam., $11\frac{1}{2}$ in.; height, 6 in. Cat. No. 212261.

BOWLS OF GRAY WARE.
McDonald's Canyon, Arizona.

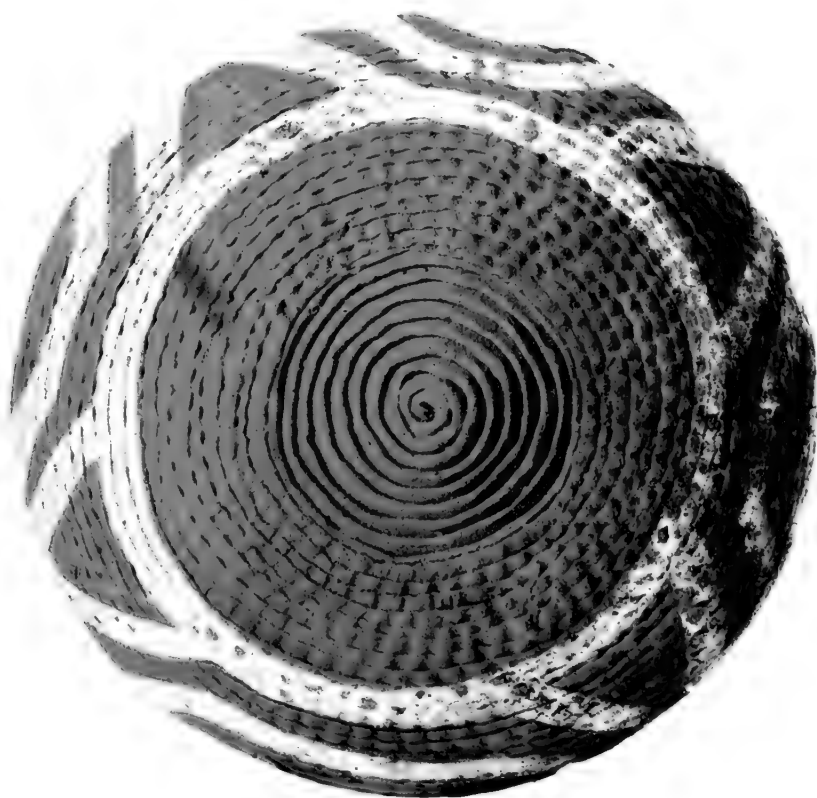


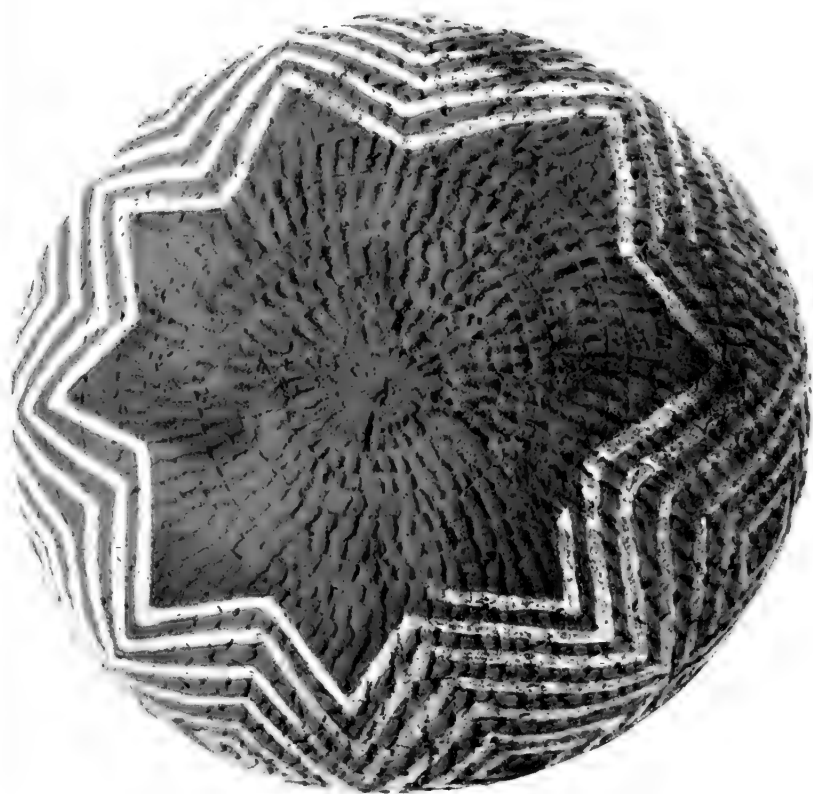
Length, 6 in.; height, 5½ in. Cat. No. 212297.



Diam., 6 in.; height, 5½ in. Cat. No. 212282.

VASES OF GRAY WARE.
McDonald's Canyon, Arizona.





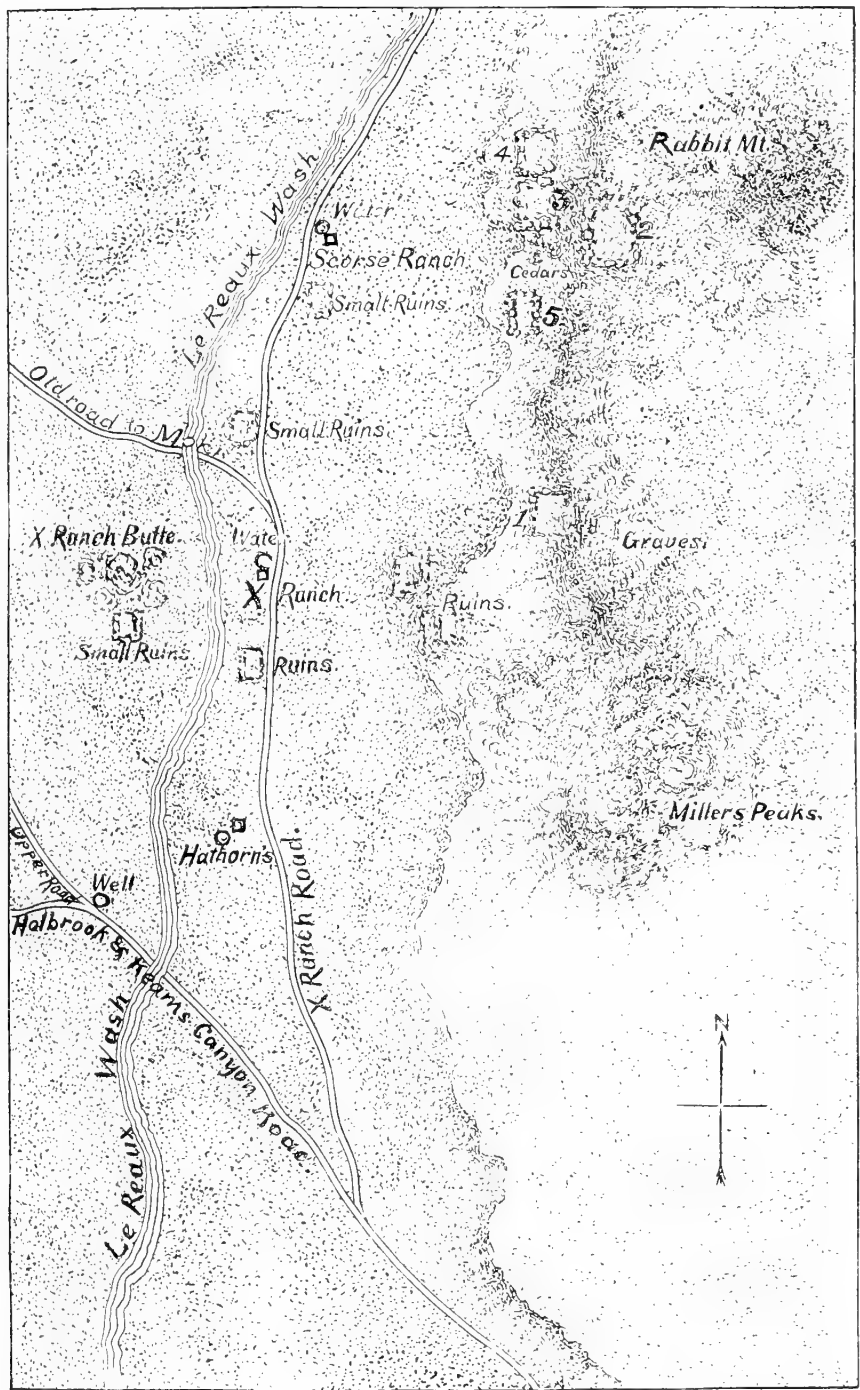


DIAM. $5\frac{1}{8}$ IN. HEIGHT, $4\frac{5}{8}$ IN. CAT. No. 212280

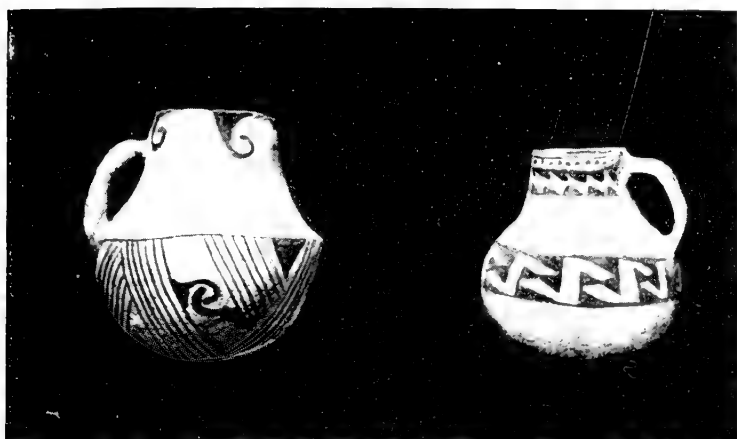


DIAM. $3\frac{5}{8}$ IN. HEIGHT, $3\frac{1}{2}$ IN. CAT. 212279

CANTEEN AND HANDLED VASE.
Mc Donalds Canyon, Arizona.



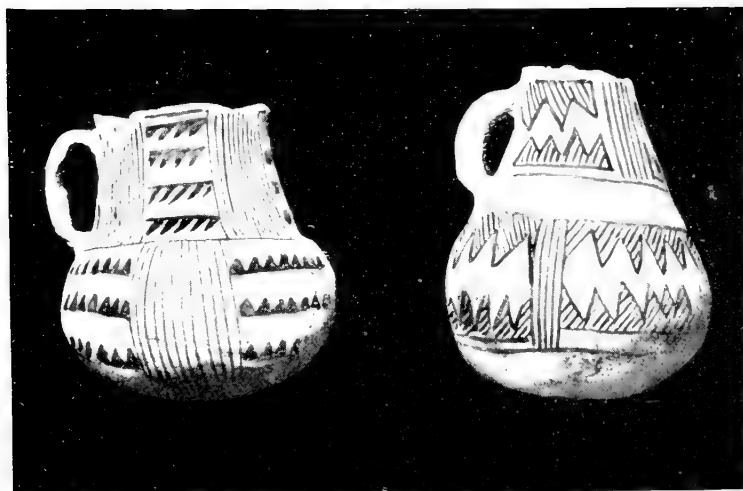
SKETCH MAP OF SCORSE RANCH RUINS.
Le Roux Wash, Arizona.



Cat. Nos. 212522 and 212529.



Cat. Nos. 212536 and 212523.



Cat. Nos. 212535 and 212538.

HANDLED VASES, GRAY WARE.
Scorse Ranch, Arizona.



Cat. No. 212503.



Cat. No. 212499.



Cat. Nos. 212520 and 212531.



Cat. Nos. 212423 and 212504

BIRD AND OTHER FORMS OF GRAY WARE.
Scorse Ranch, Arizona.



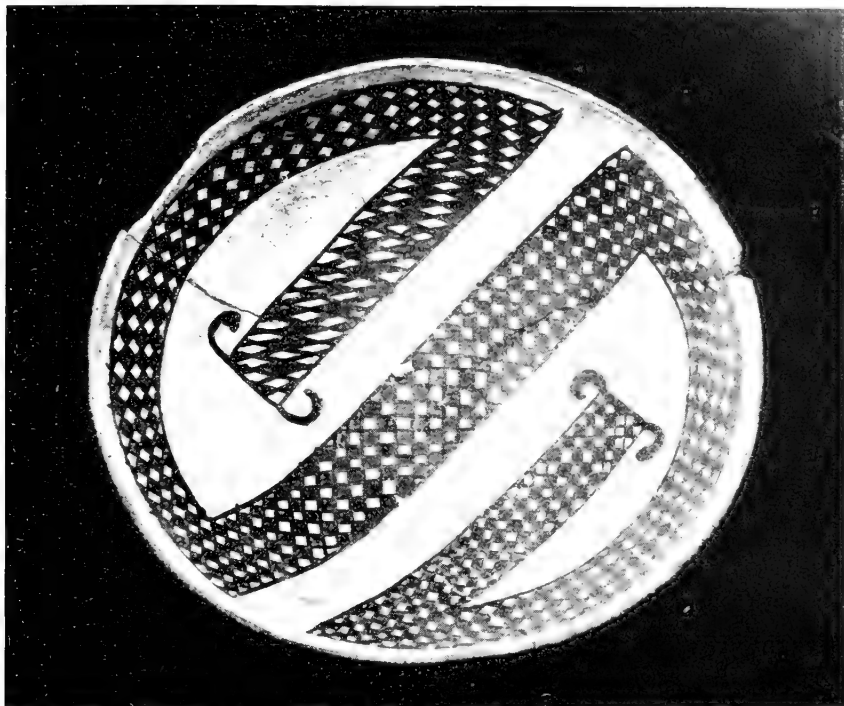
Diam., $9\frac{7}{8}$ in.; height, $5\frac{1}{4}$ in. Cat. No. 212436.



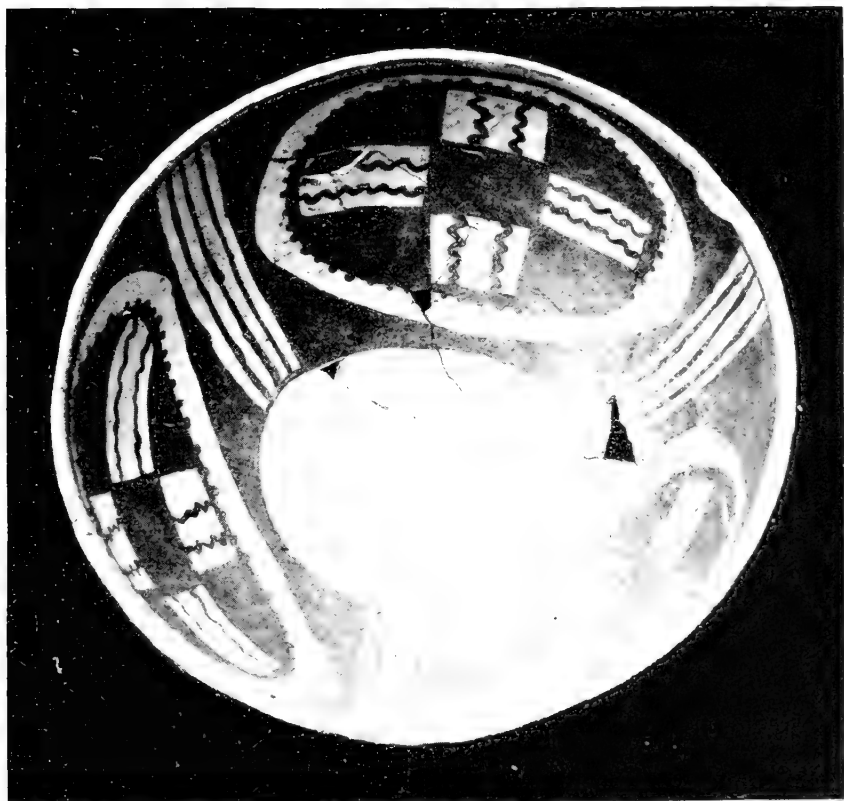
Diam., 9 in.; height, $4\frac{1}{4}$ in. Cat. No. 212441.

BOWLS OF GRAY WARE.

Scorse Ranch, Arizona.



Diam., 9½ in.; height, 3¼ in. Cat. No. 212430.



Diam., 9½ in.; height, 3 in. Cat. No. 212429.

BOWLS OF GRAY WARE.
Score Ranch, Arizona





CAT. No. 212488



CAT. No. 212582



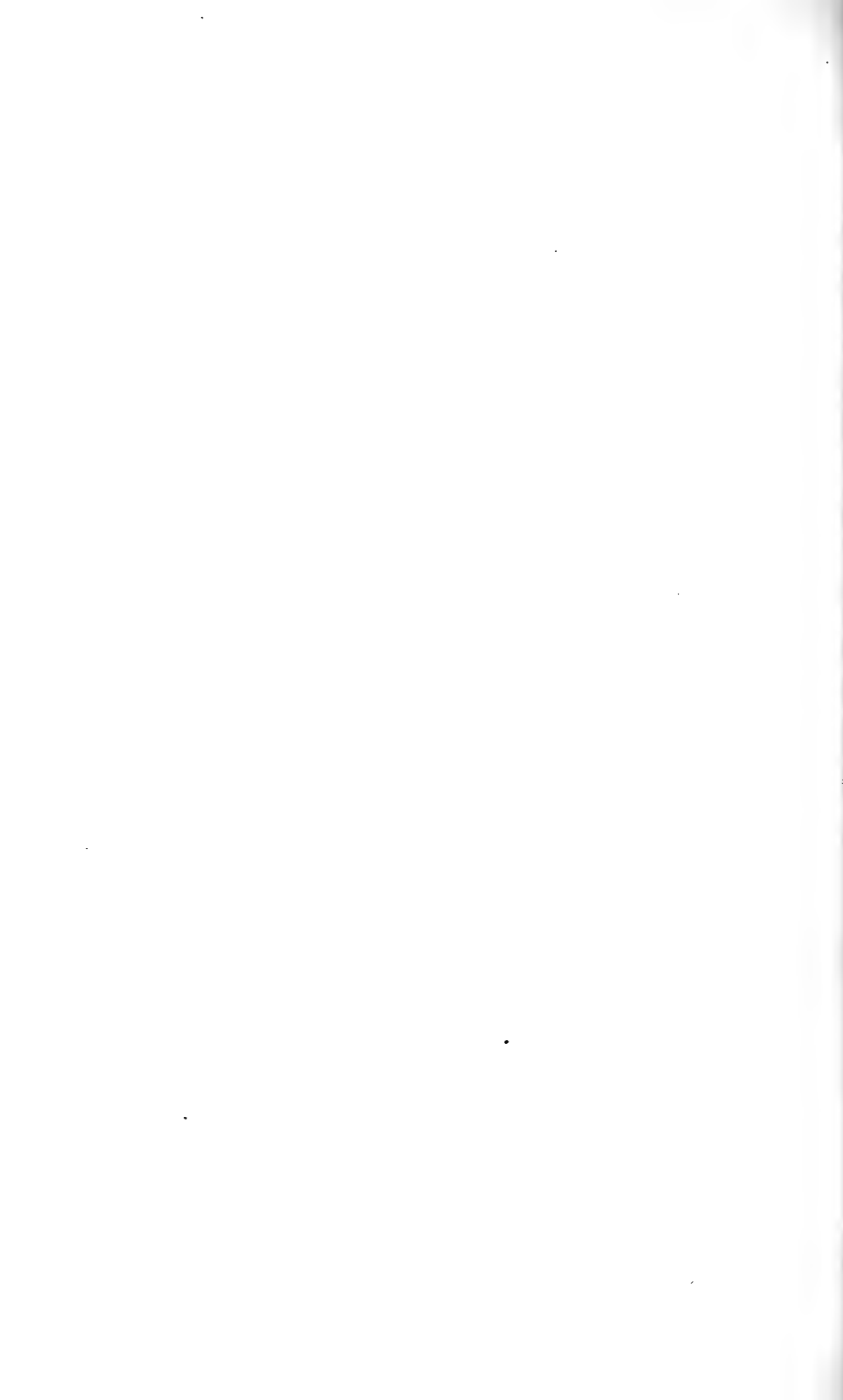
CAT. No. 212494

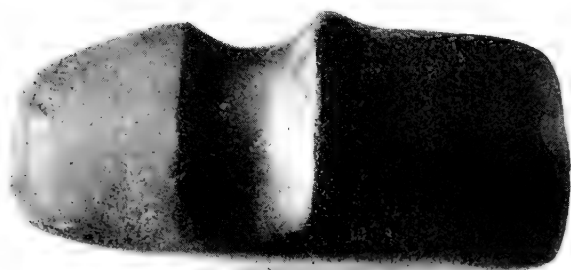
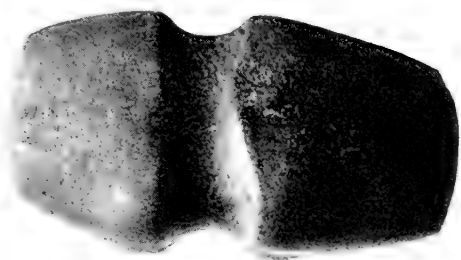


CAT. No. 212508



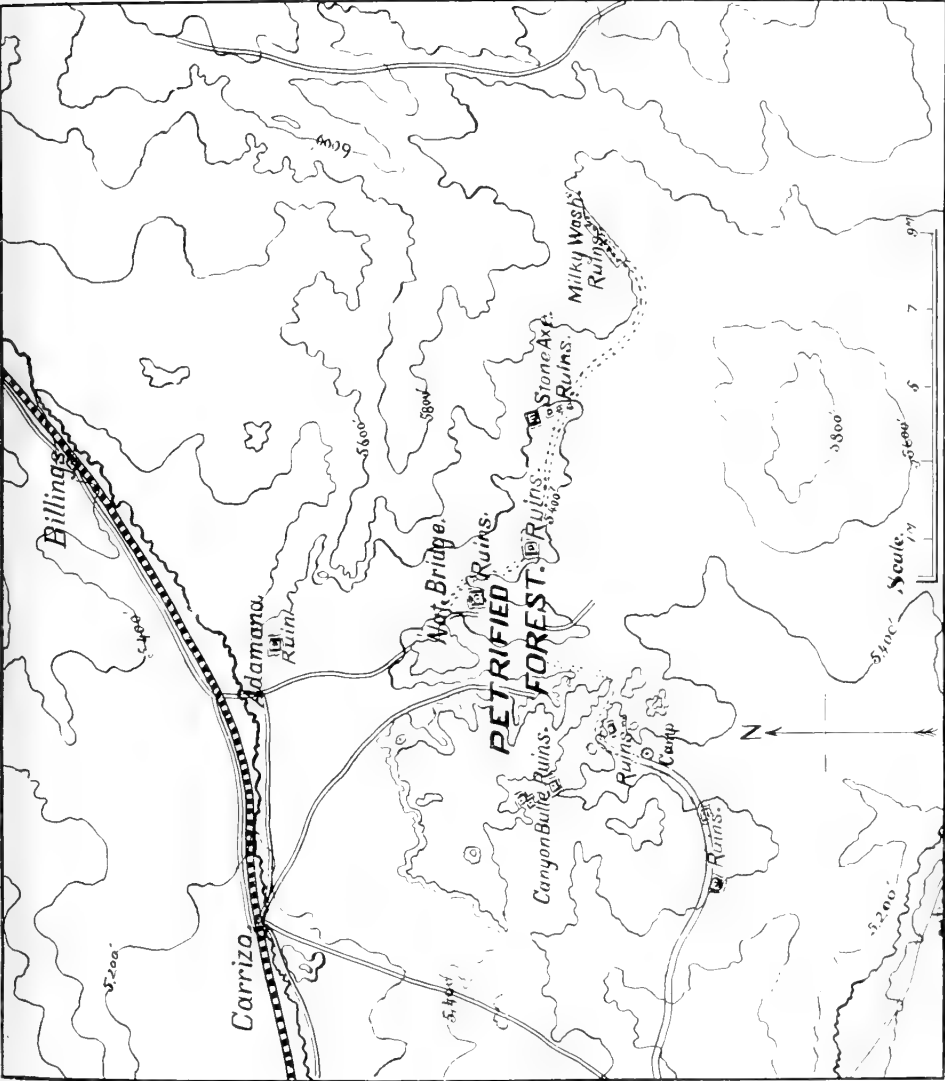
CAT. No. 212509





STONE AXES, MORTAR AND PESTLE.

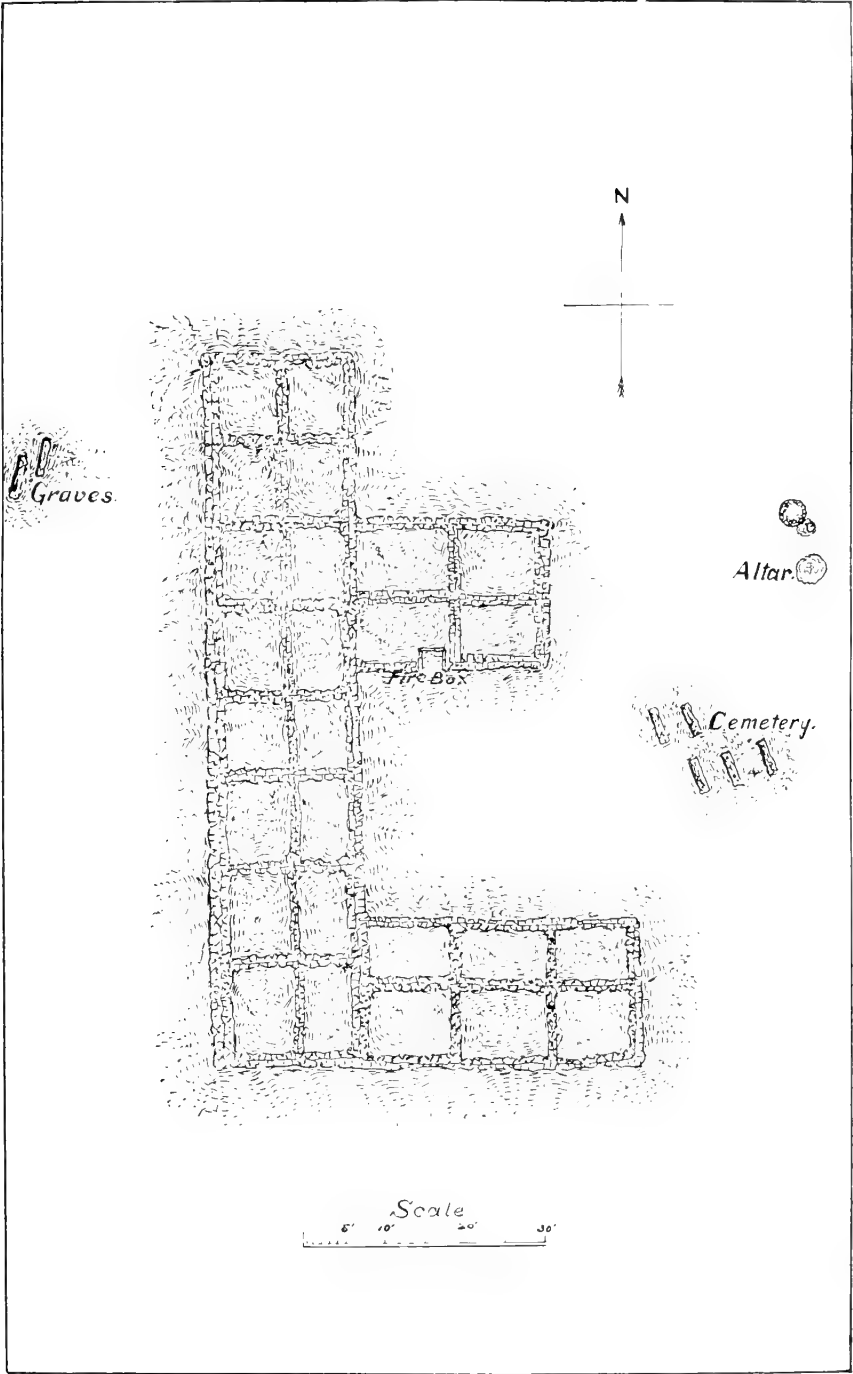
Scorse Ranch, Arizona.



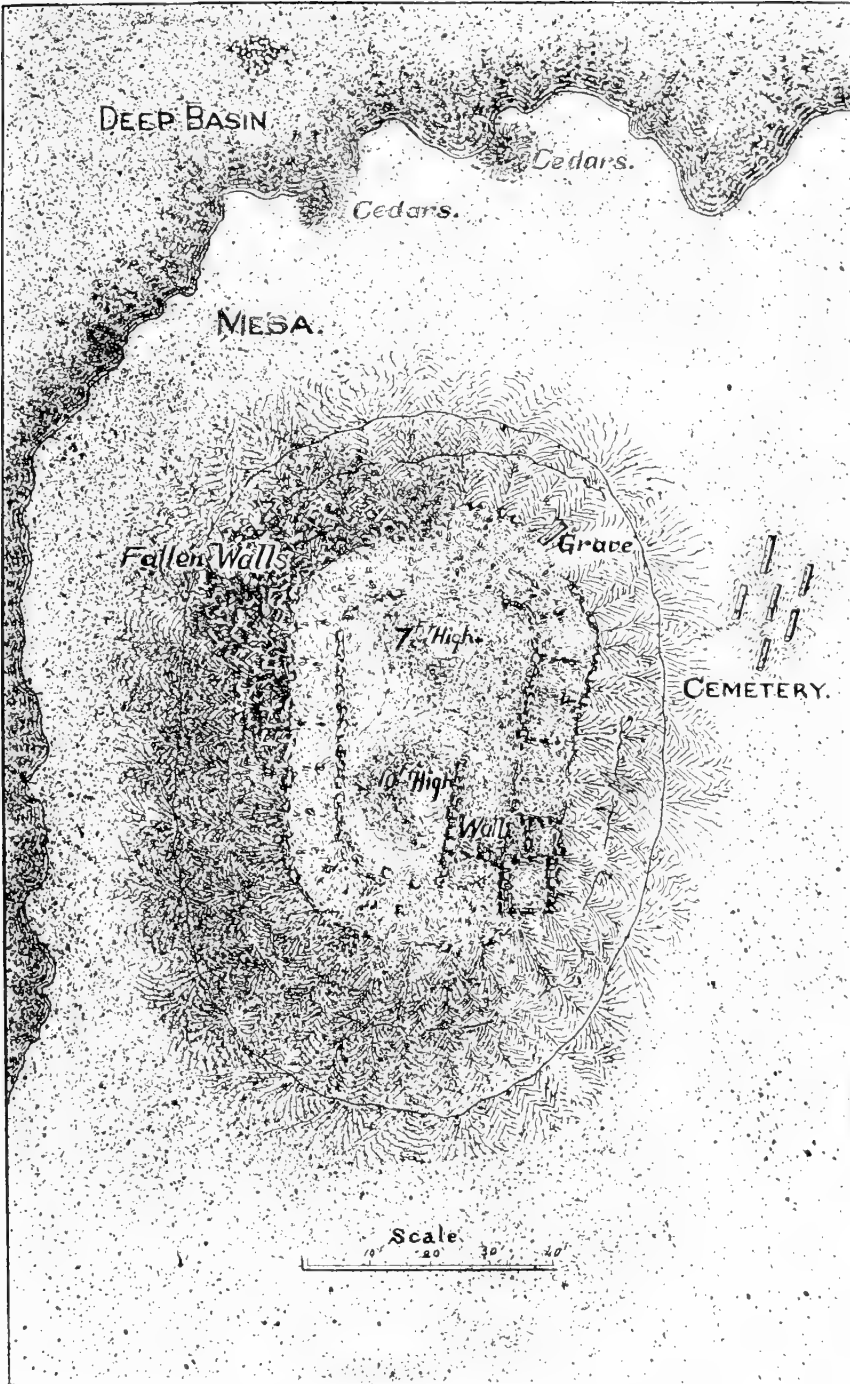
SKETCH MAP OF REGION OF THE PETRIFIED FOREST, ARIZONA.



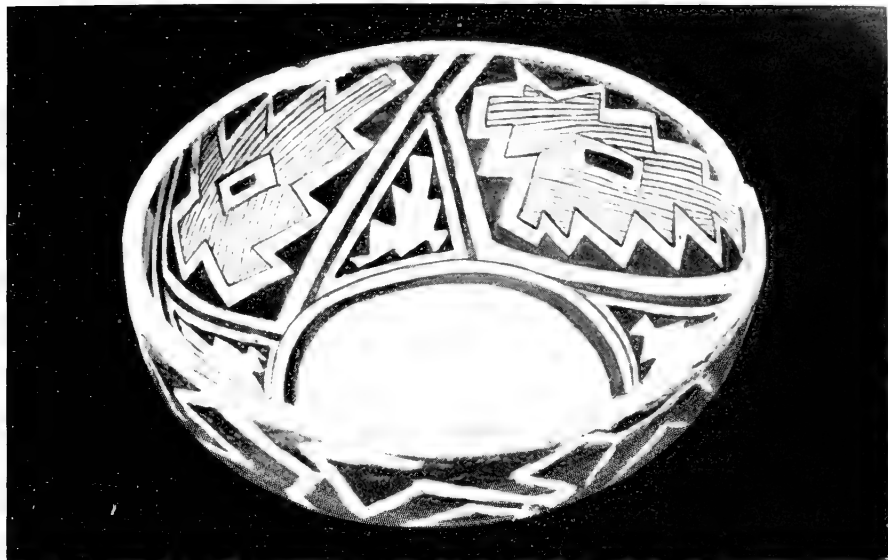
Canyon Butte Wash, Arizona.



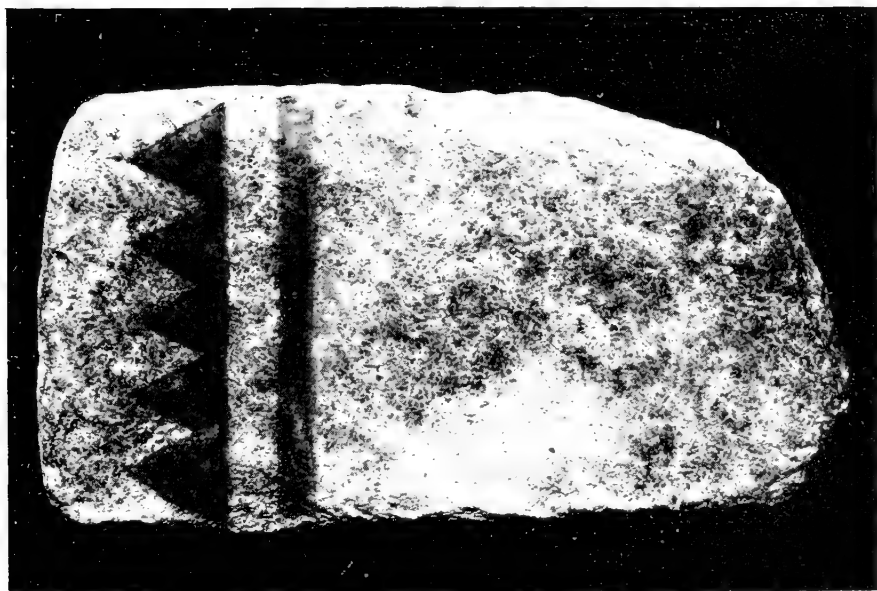
PLAN OF RUIN 2.
Canyon Butte Wash, Arizona.



PLAN OF RUIN 3.
Canyon Butte Wash, Arizona.



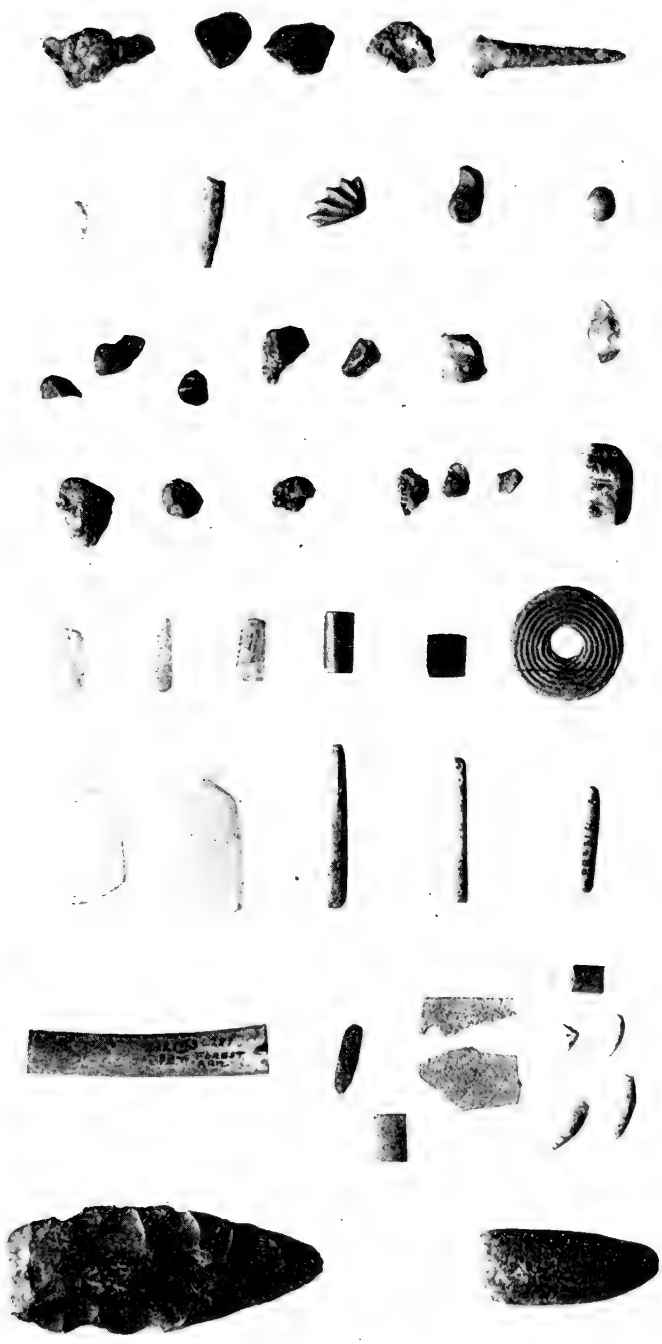
Diam., 8½ in.; height, 3¼ in. Cat. No. 212108.



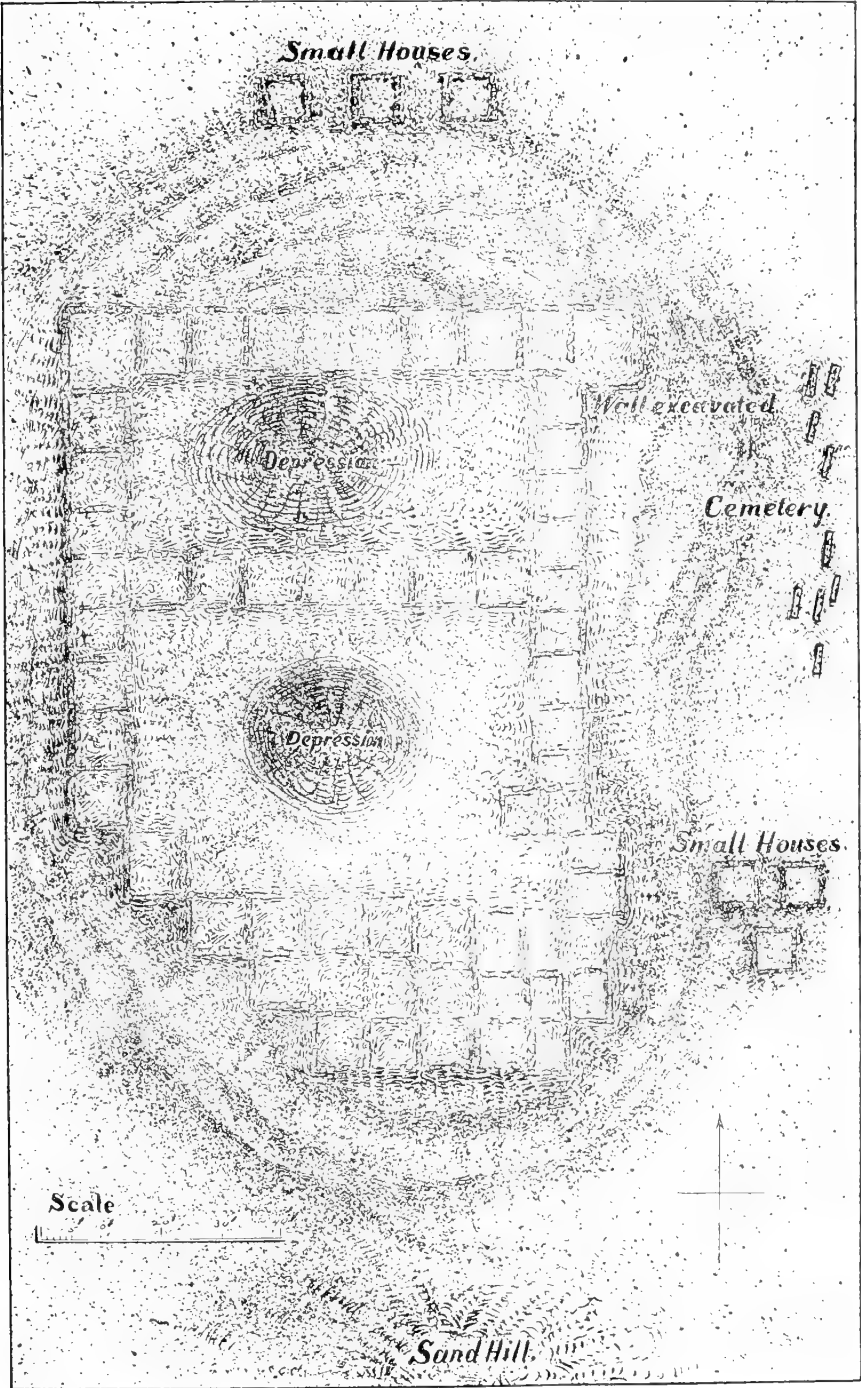
Length, 12 in.; width, 7 in.; height, 2 in. Cat. No. 212066.

POLYCHROME BOWL AND PAINTED STONE TABLET.

Canyon Butte Wash, Arizona.



OUTFIT OF MEDICINE MAN.
Canyon Butte Wash, Arizona.



PLAN OF RUIN 4.
Canyon Butte Wash, Arizona.



Diam., $3\frac{1}{2}$ in.; height, $3\frac{1}{2}$ in. Cat. No. 212042.
Diam., 4 in.; height, $2\frac{1}{2}$ in. Cat. No. 212237.



Diam., 5 in.; height, $4\frac{1}{2}$ in. Cat. No. 212080.
Diam., $4\frac{1}{2}$ in.; height, $3\frac{1}{2}$ in. Cat. No. 212163.

COILED WARE.

Canyon Butte Wash, Arizona.



CANYON BUTTE 1911 1912





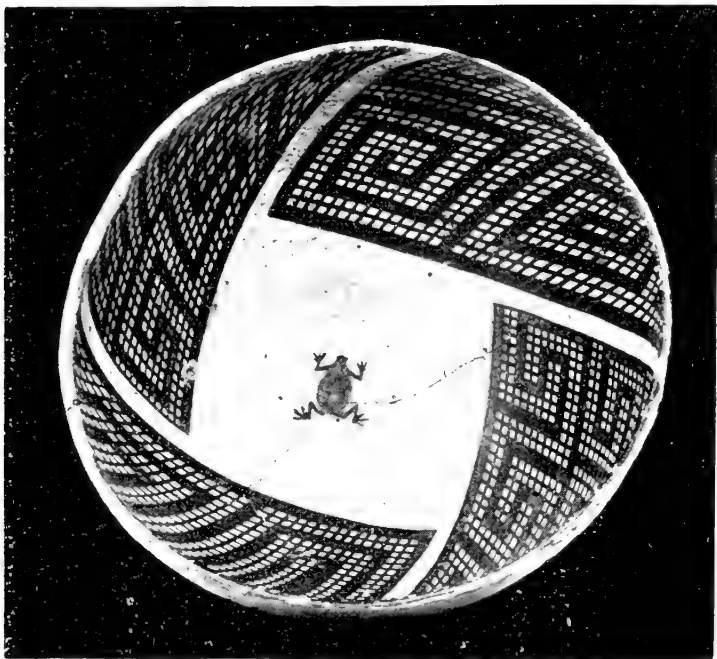
DIAM. $11\frac{1}{2}$ IN. HEIGHT, 5 IN. CAT. No. 212074



SIDE AND INTERIOR VIEW OF SAME

RED AND BROWN BOWL, EXTERIOR AND INTERIOR DECORATION.
Canyon Butte, Arizona.





Diam., 8½ in.; height, 4 in. Cat. No. 212056.



Diam., 11¼ in.; height, 6¼ in. Cat. No. 212075.

BOWLS OF GRAY WARE.
Canyon Butte Wash, Arizona.



Diam., 6 in.; height, 5 in. Cat. No. 212026.



Diam., 7½ in.; height, 7½ in. Cat. No. 155128.



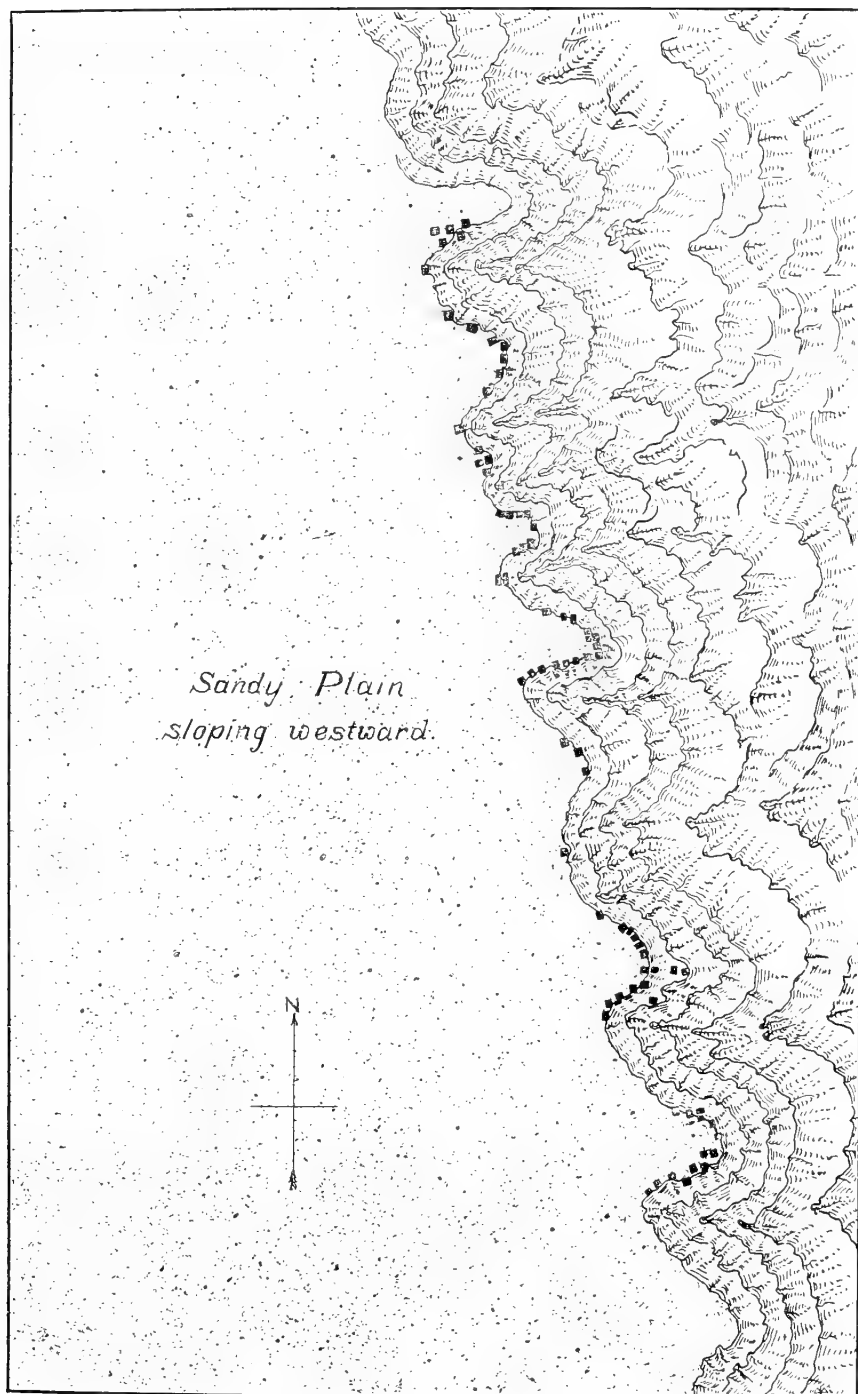
Diam., 7 in.; height, 8½ in. Cat. No. 68376.

VASES OF GRAY WARE.

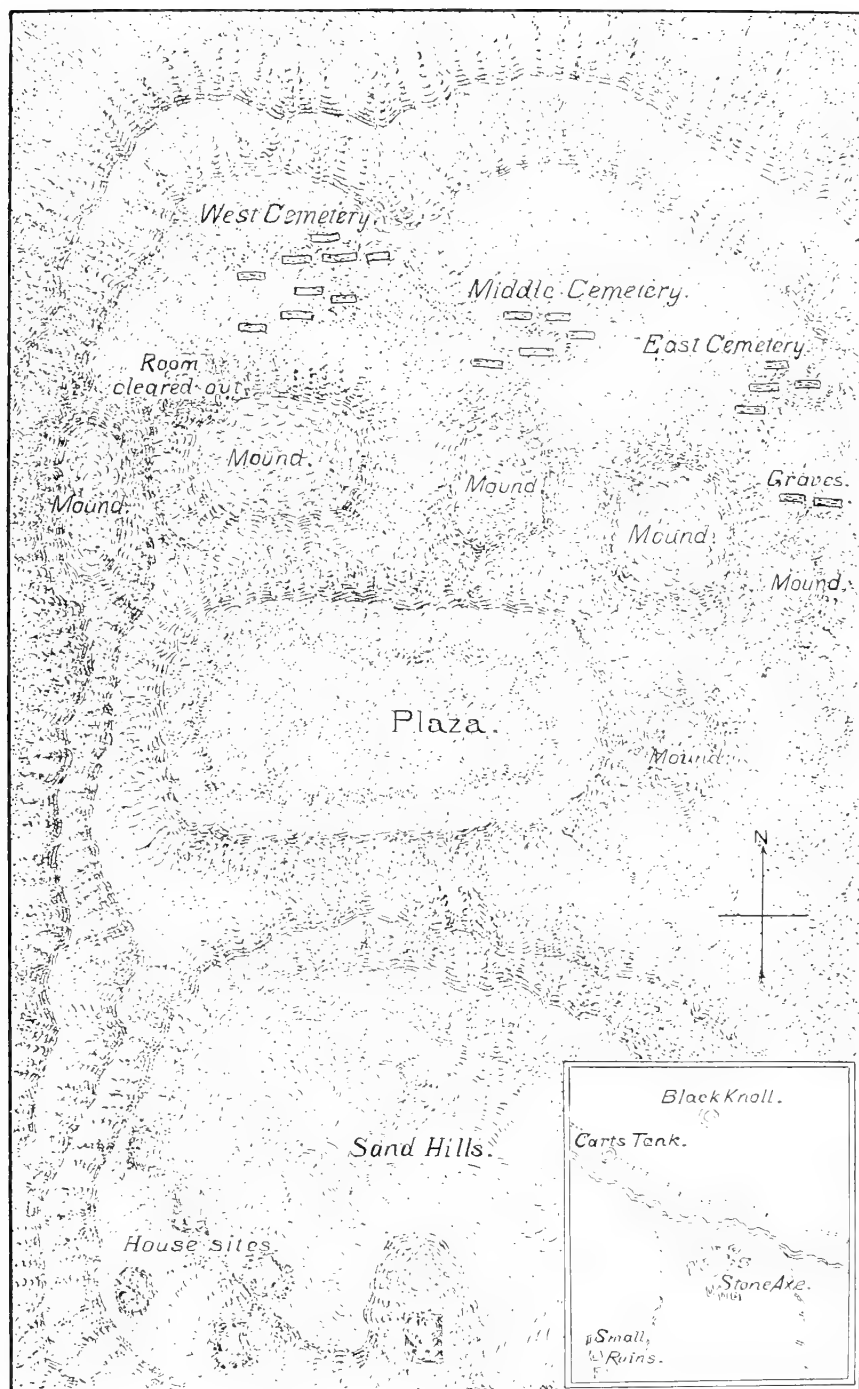
Northeastern Arizona and New Mexico.



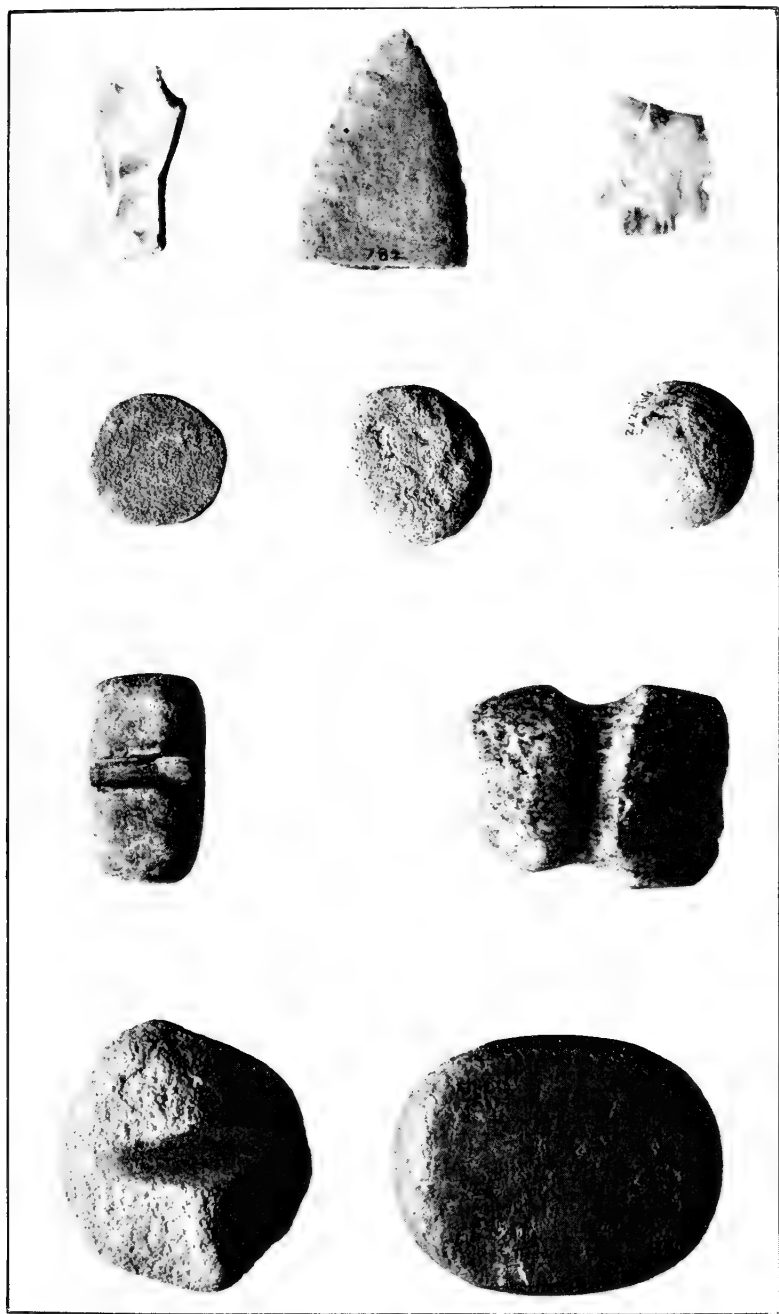
PIPES FROM ANCIENT PUEBLOS.
Arizona.



PLAN OF MILKY HOLLOW RUIN, ARIZONA.



PLAN OF STONE AXE RUIN, ARIZONA.



STONE IMPLEMENTS.

Stone Age, Arizona.



BONE, POTTERY, SHELL, AND STONE OBJECTS.
Stone Axe Ruin, Arizona.



DIAM. $15\frac{1}{2}$ IN. HEIGHT, $10\frac{1}{2}$ IN. CAT. No. 212753

LARGE VASE, POLYCHROME WARE.

Stone Axe, Arizona.

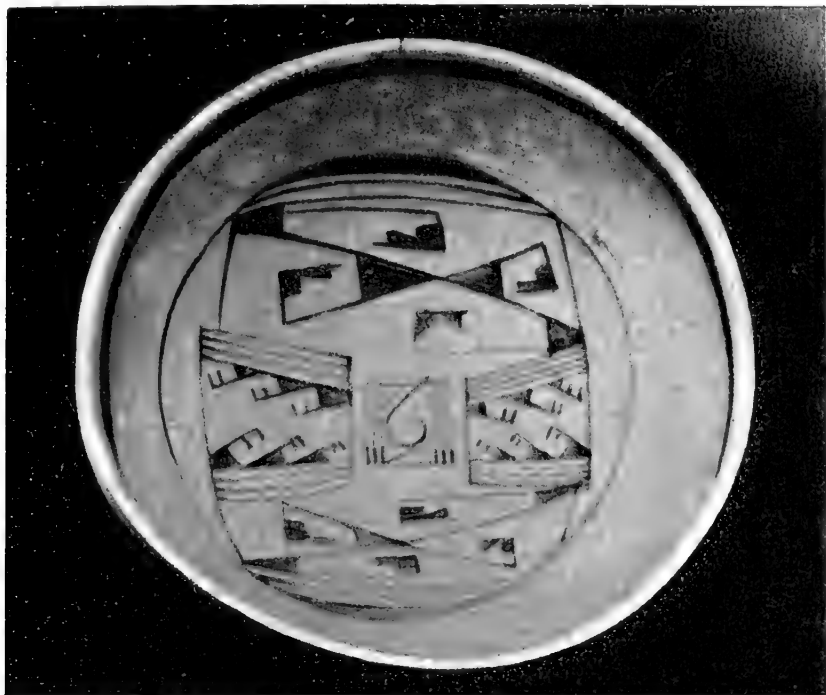


DIAM. $6\frac{1}{4}$ IN. HEIGHT, $2\frac{3}{4}$ IN. CAT. No. 212737



DIAM. $6\frac{1}{4}$ IN. HEIGHT, $4\frac{1}{2}$ IN. CAT. No. 212740

BOWL AND VASE.
Stone Age, Arizona.



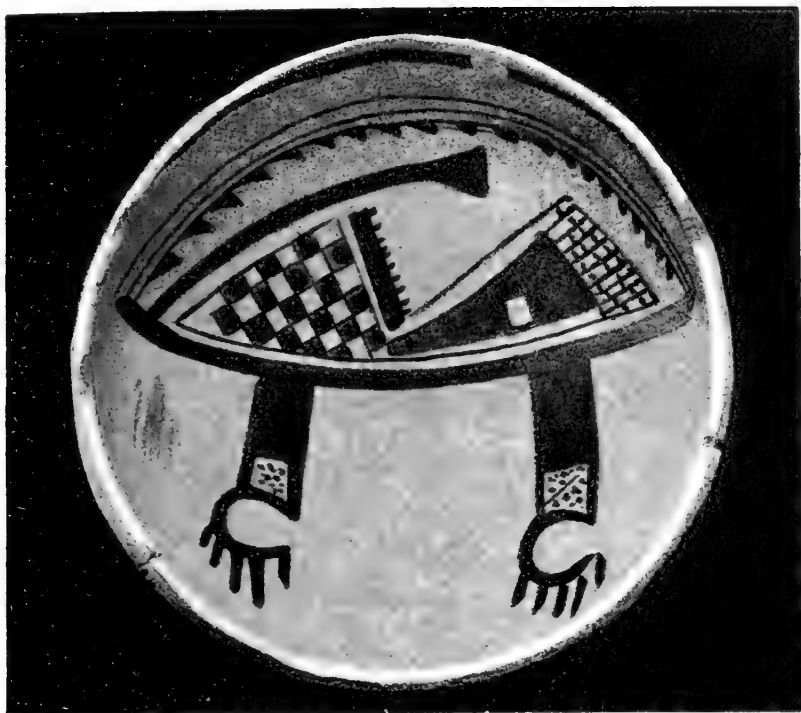
DIAM. 9 IN HEIGHT. 4 IN CAT No 212735



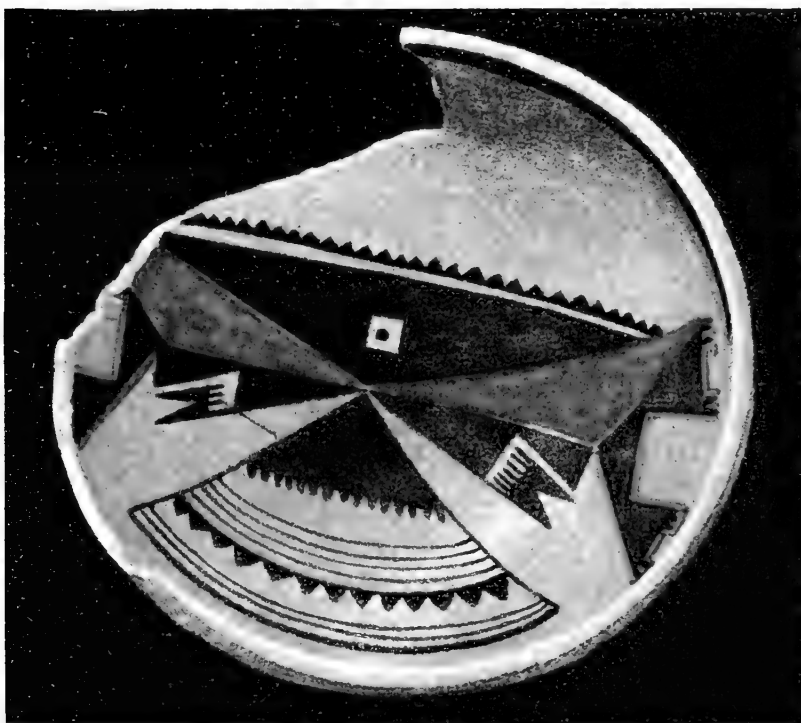
DIAM. 8½ IN HEIGHT. 3⅞ IN CAT No 212734

BOWLS, YELLOW WARE.

Stone Axe Arizona.

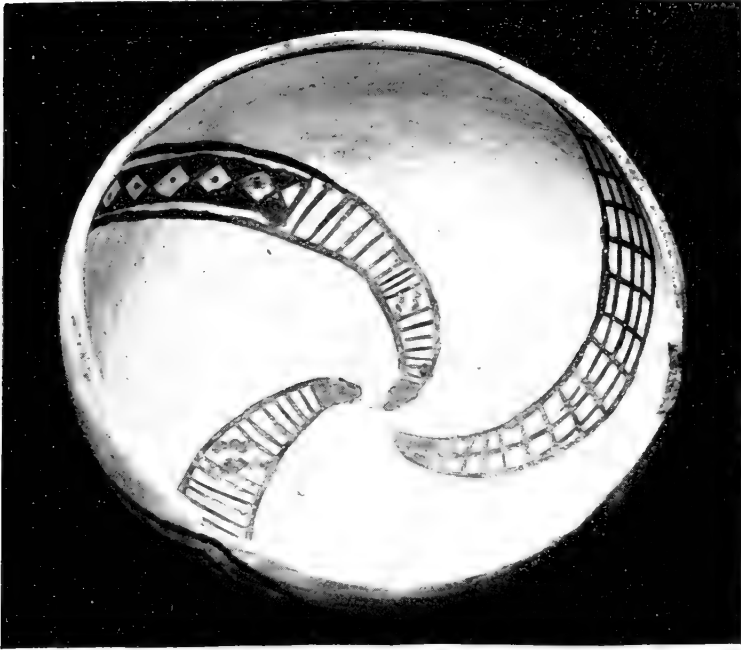


DIAM. $8\frac{1}{4}$ IN. HEIGHT, $3\frac{3}{4}$ IN. CAT. No. 212718

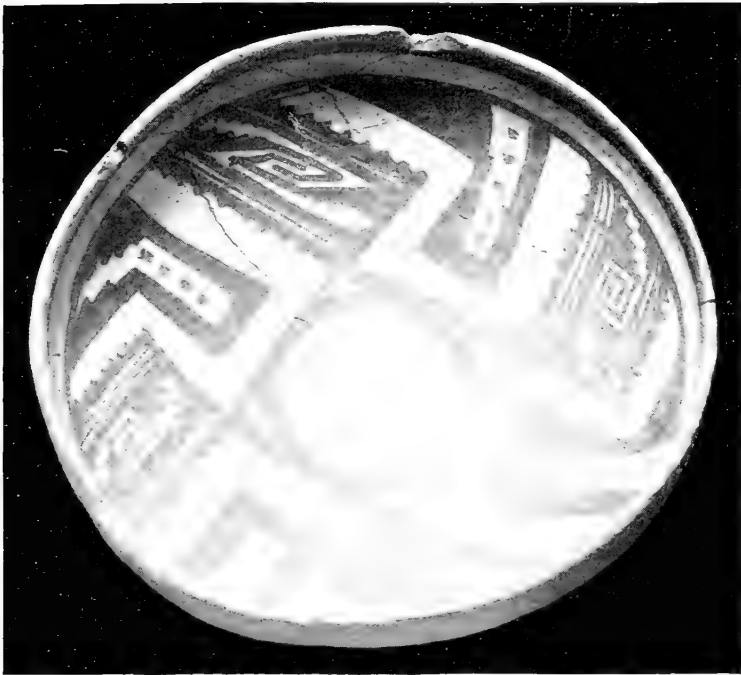


DIAM. $8\frac{1}{2}$ IN. HEIGHT, $3\frac{3}{4}$ IN. CAT. No. 212746

BOWLS SHOWING SYMBOLISM.
Stone Axe Ruin, Arizona.



Diam., 8 in.; height, $3\frac{1}{4}$ in. Cat. No. 212712.



Diam., 9 in.; height, $3\frac{1}{4}$ in. Cat. No. 212711.

BOWLS, WHITE AND GILA WARE.

Stone Axe Ruin, Arizona.



DIAM. $8\frac{3}{4}$ IN HEIGHT, $3\frac{3}{4}$ IN CAT. No 212751



DIAM $9\frac{1}{4}$ IN. HEIGHT, $3\frac{1}{2}$ IN CAT No. 212743

BOWLS, YELLOW-BROWN AND RED, WITH WHITE LINES
Stone Axe Ruin, Arizona.





DIAM $4\frac{1}{8}$ IN HEIGHT 3 IN CAT. No. 212741

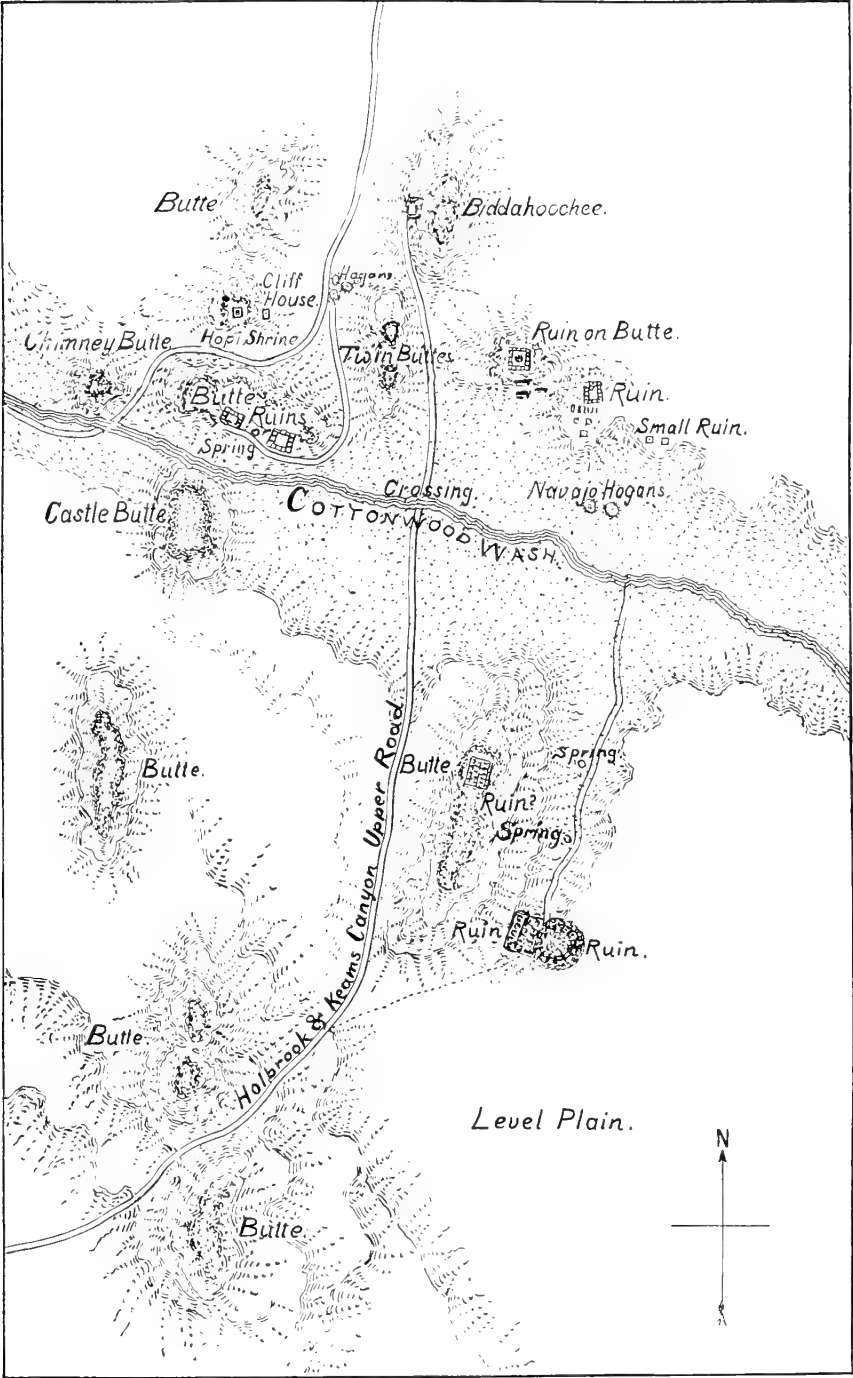


DIAM $7\frac{1}{8}$ IN HEIGHT 6 IN CAT. No. 212790

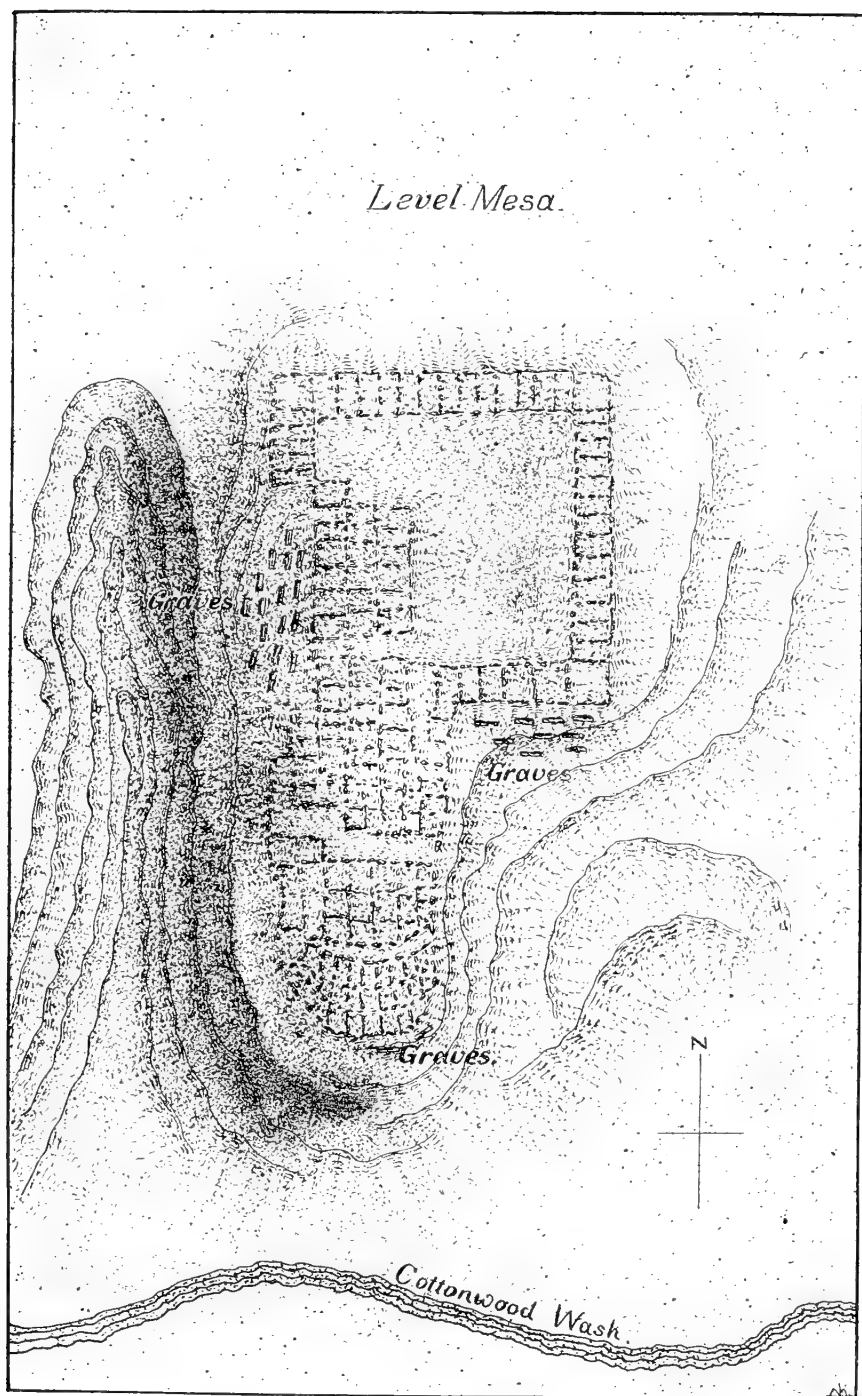
VASES WITH ANIMAL HANDLES

Stone axe ruin, Arizona.



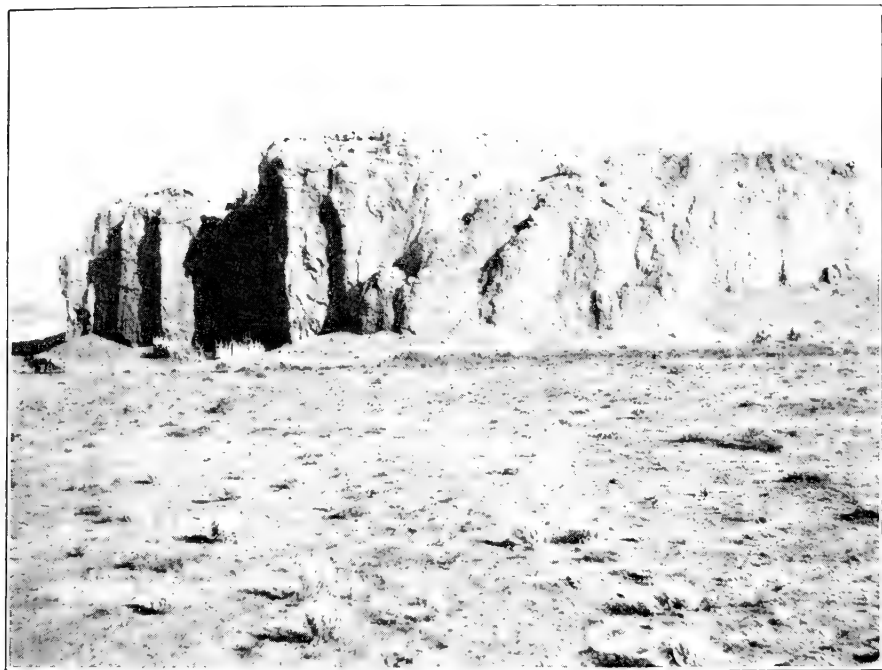


SKETCH MAP OF BIDDAAHOCHEE GROUP OF RUINS, ARIZONA.



PLAN OF RUIN ON BLUFF.

Biddahoochee, Arizona.



1, BLACK BUTTE; 2, RUIN IN FRONT OF BUTTE.

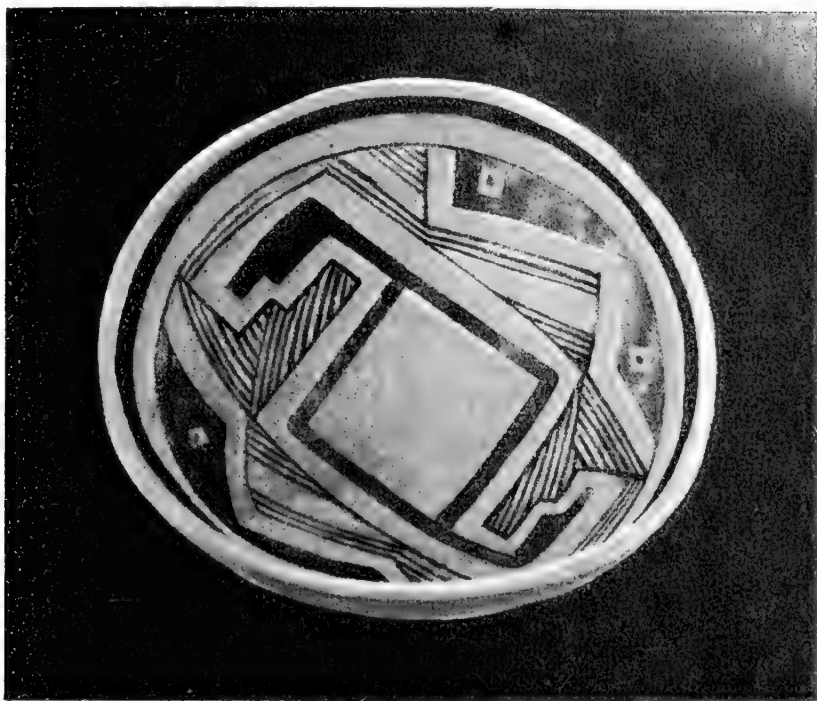
Biddahoochee, Arizona.



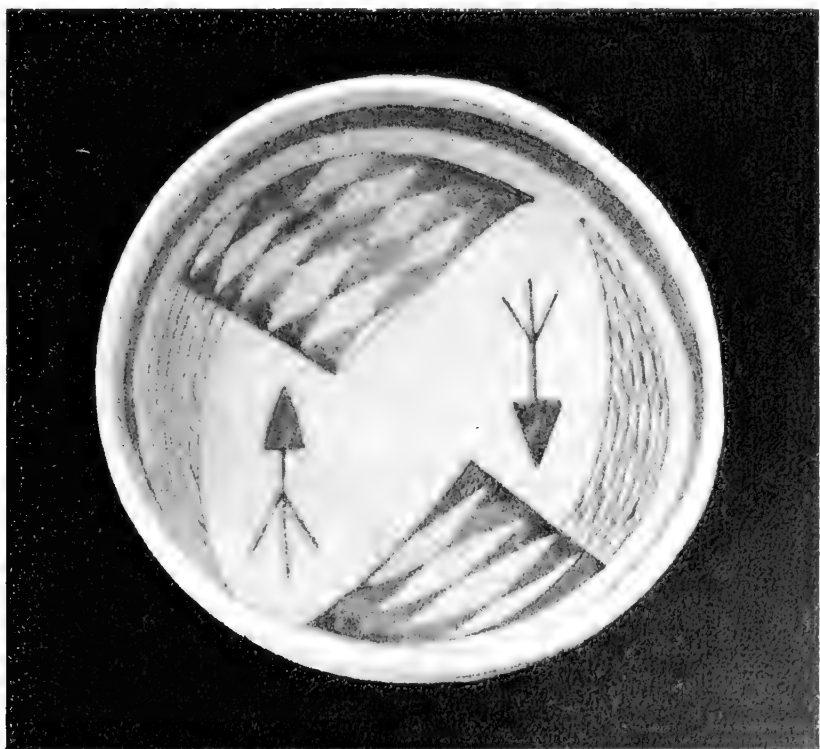
DIAM. 9 IN HEIGHT, 1 3/4 IN CAT. No. 212322



DIAM. 8 1/2 IN HEIGHT, 2 1/8 IN CAT. No. 212323

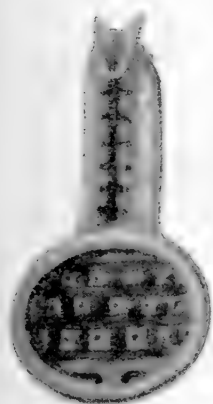


DIAMS $7\frac{3}{4}$ IN AND $8\frac{5}{8}$ HEIGHT $3\frac{1}{4}$ IN CAT NO. 2321



DIAM $8\frac{3}{8}$ IN HEIGHT 3 IN CAT NO. 21320

BOWLS, YELLOW WARE
Biddahoochee Arizona



CAT. No. 212381



CAT. No. 212382



CAT. No. 212354



CAT. No. 212355

DIPPERS, CUP, AND HANDLED BOWL

Biddahoochee, Arizona.



DIAM $4\frac{5}{8}$ IN. HEIGHT, $3\frac{7}{8}$ IN. CAT. No. 212368



DIAM. $5\frac{1}{4}$ IN. HEIGHT, $4\frac{5}{8}$ IN. CAT. No. 212367



DIAM $6\frac{1}{8}$ IN. HEIGHT, $4\frac{5}{8}$ IN. CAT No 212363



DIAM. $6\frac{1}{4}$ IN. HEIGHT, $4\frac{1}{4}$ IN. CAT No. 212366

. VASES OF YELLOW-BROWN, AND LEMON-YELLOW.

. Biddahoochee, Arizona.



DIAM. $11\frac{1}{2}$ IN. HEIGHT, $8\frac{1}{2}$ IN. CAT. NO. 212334

VASE OF ORANGE COLOR.
Biddanoochee, Arizona.



DIAM. $10\frac{1}{4}$ IN. HEIGHT, 4 IN. CAT. No. 212330

BOWL, RED WARE, GREEN DECORATION.

Biddahoochee, Arizona

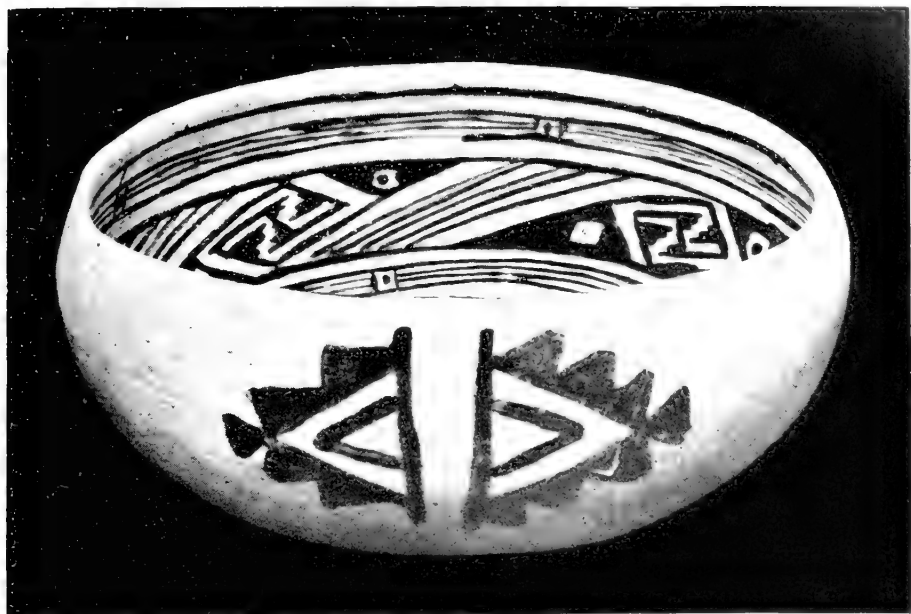


DIAM. $7\frac{1}{4}$ IN HEIGHT, $3\frac{3}{8}$ IN CAT. No. 212345



DIAM. $7\frac{3}{4}$ IN HEIGHT, $3\frac{1}{4}$ IN. CAT. No. 212346

BOWLS OF POLYCHROME WARE.
Biddahoochee Arizona



Diam., 8½ in.; height, 4 in. Cat. No. 212329.



Diam., 8½ in.; height, 4 in. Cat. No. 212328.

BOWLS OF WHITE WARE.

Biddahoochee, Arizona



DIAM. $4\frac{5}{8}$ IN. HEIGHT, $3\frac{7}{8}$ IN. CAT. NO. 212369



DIAM. $6\frac{1}{4}$ IN. HEIGHT, 5 IN. CAT. NO. 212394

VASES OF WHITE WARE.

Biddahoochee, Arizona.



Diam., 6½ in.; height, 2½ in. Cat. No. 212390.



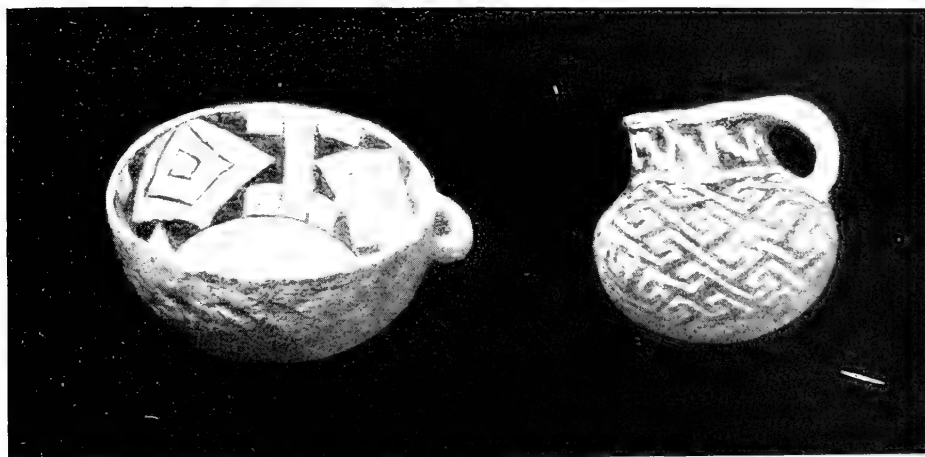
Diam., 6½ in.; height, 6½ in. Cat. No. 212371.

DIPPER AND VASE, GRAY WARE.

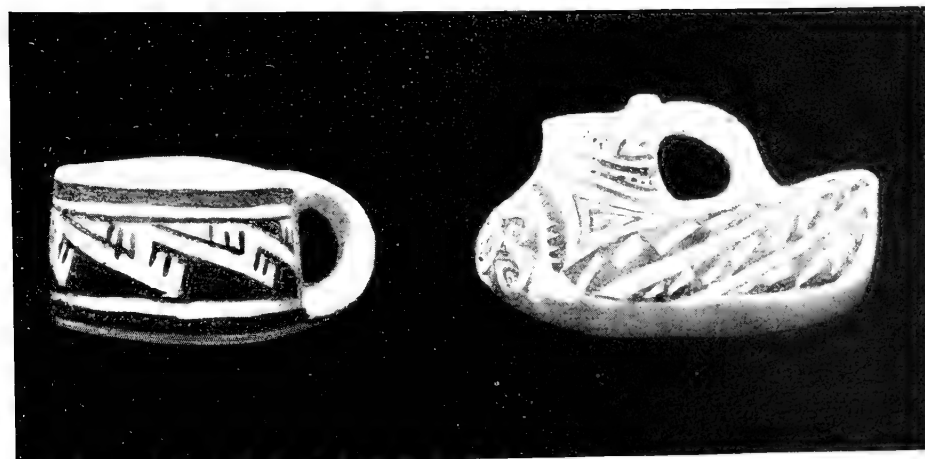
Biddahochee, Arizona.



Cat. Nos. 212302 and 212351.



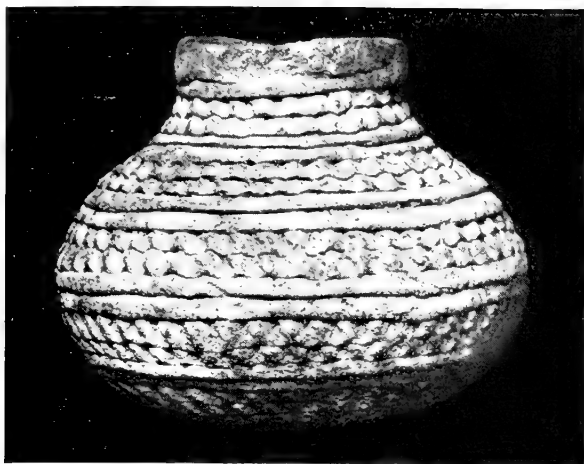
Cat. Nos. 212348 and 212357.



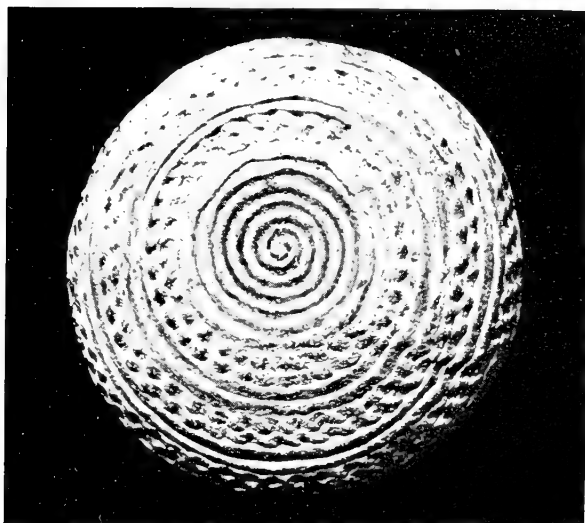
Cat. Nos. 212355 and 212372.

SMALL VESSELS. GRAY WARE.

Biddahoochee, Arizona.



Cat. No. 212375 (front view).



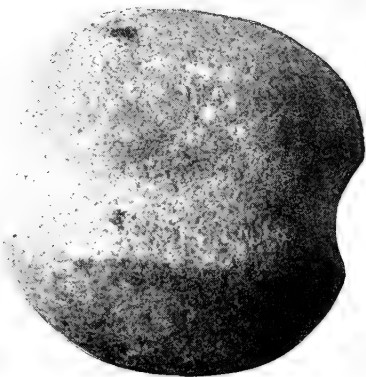
Cat. No. 212375 (bottom).



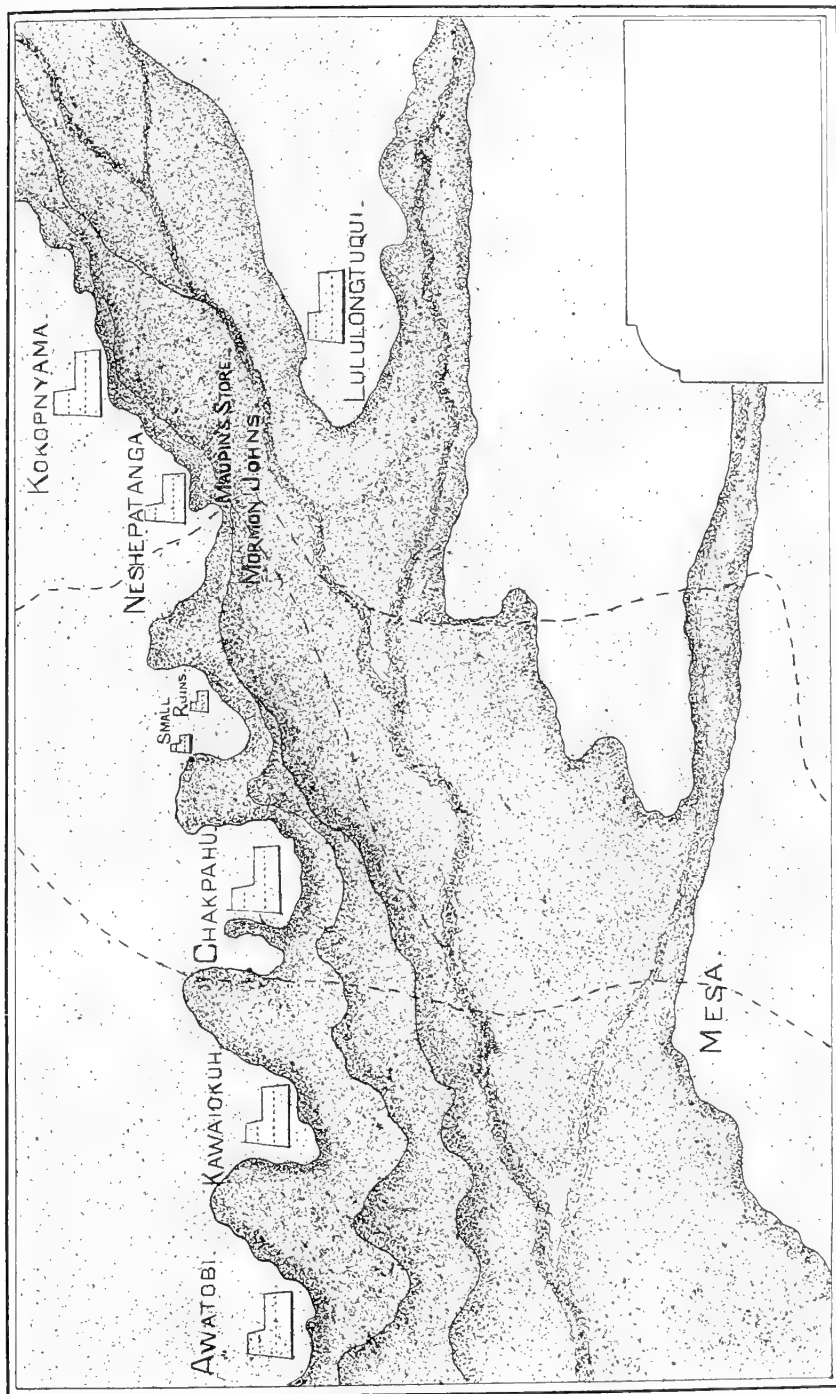
Cat. No. 212373.

COILED WARE.

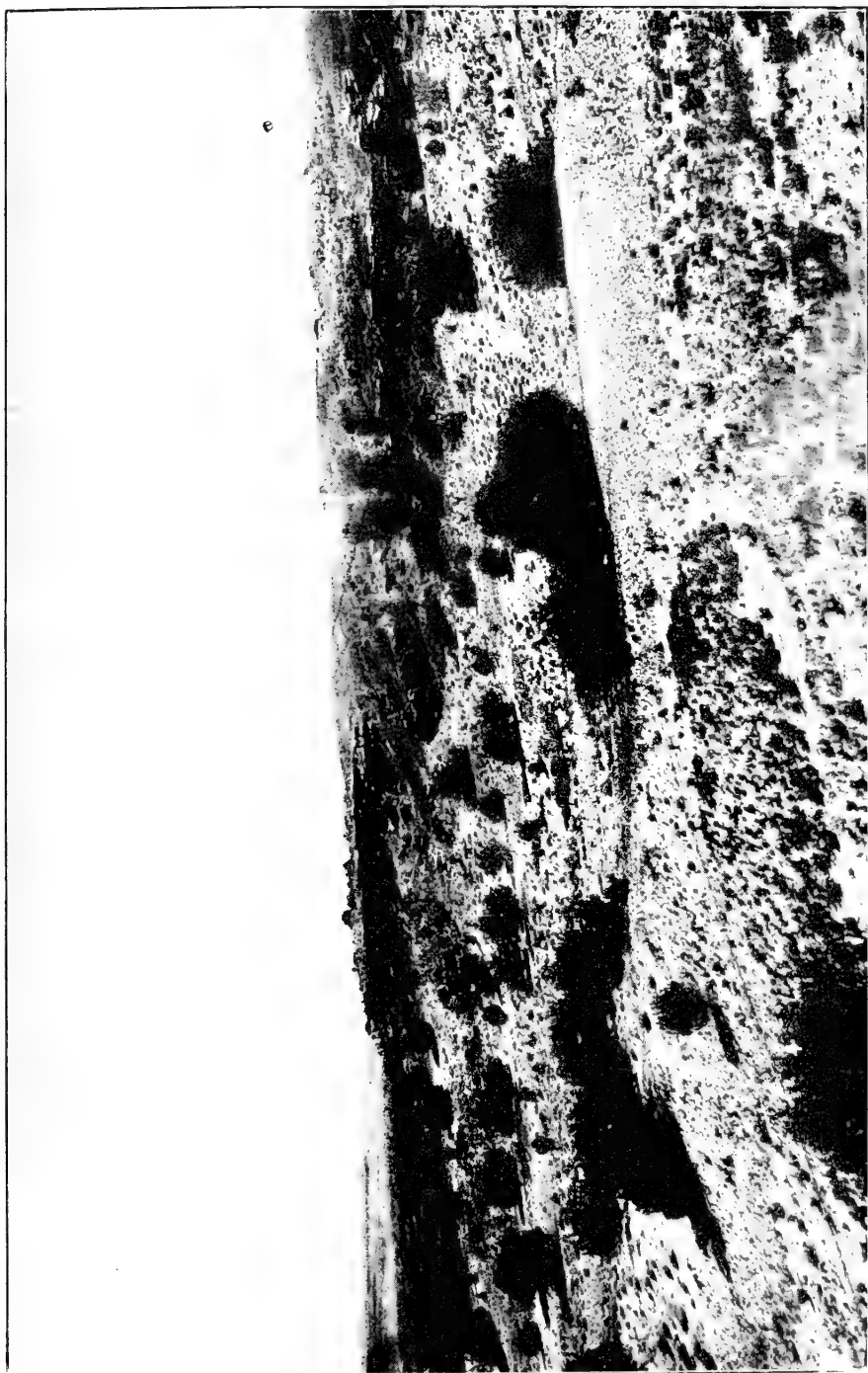
Biddahoochee, Arizona.



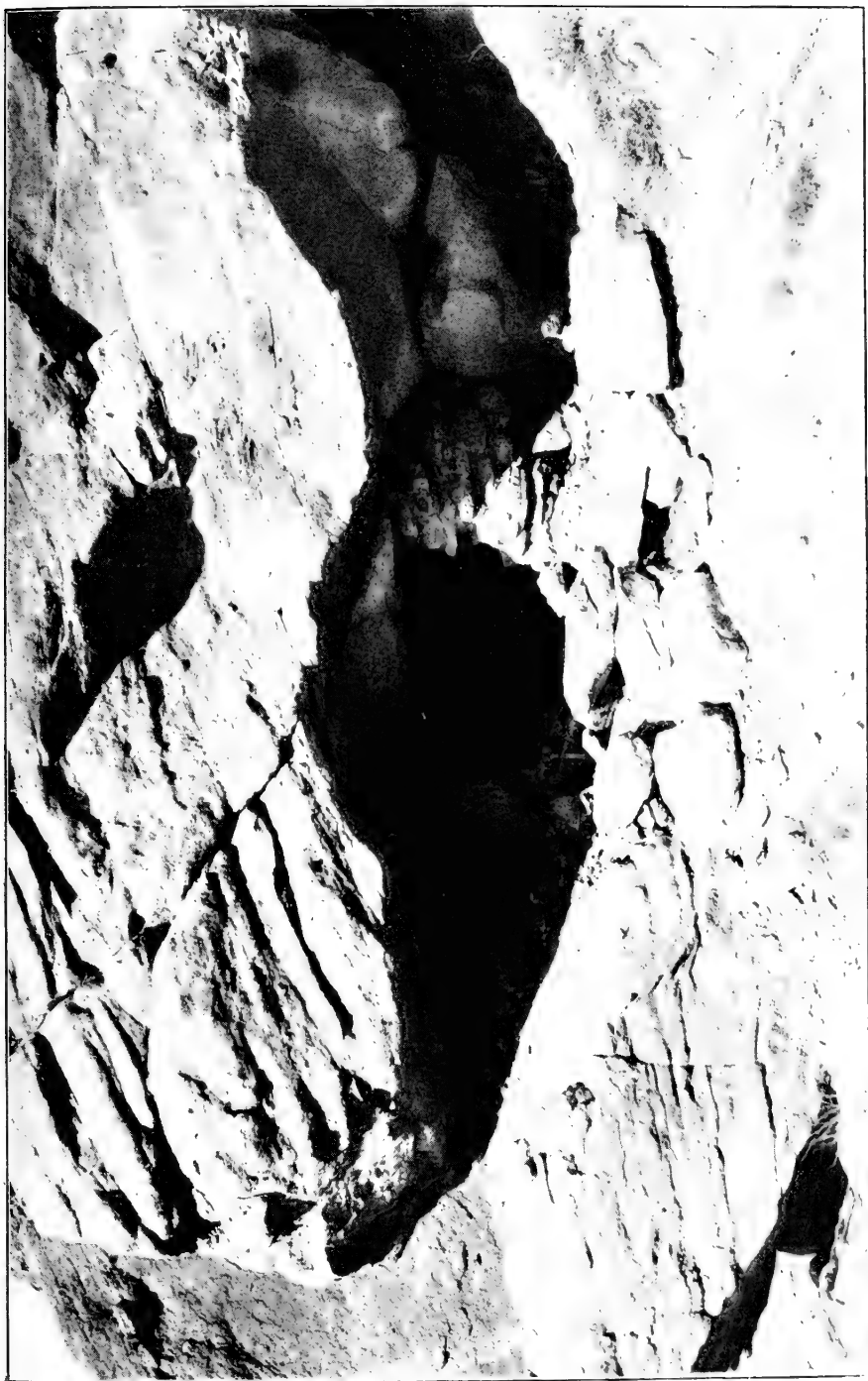
STONE IMPLEMENTS.
Biddahoochee, Arizona.



SKETCH MAP OF JETTYTO VALLEY RUINS, ARIZONA.



GENERAL VIEW OF KOKOPNYAMA RUIN.
Jettito Valley, Arizona.



CIST IN ROCKS.

Kokopnyama, Jettyto Valley, Arizona.



EXCAVATING IN THE TALUS.
Kokopoyama, Jetty to Valley, Arizona.

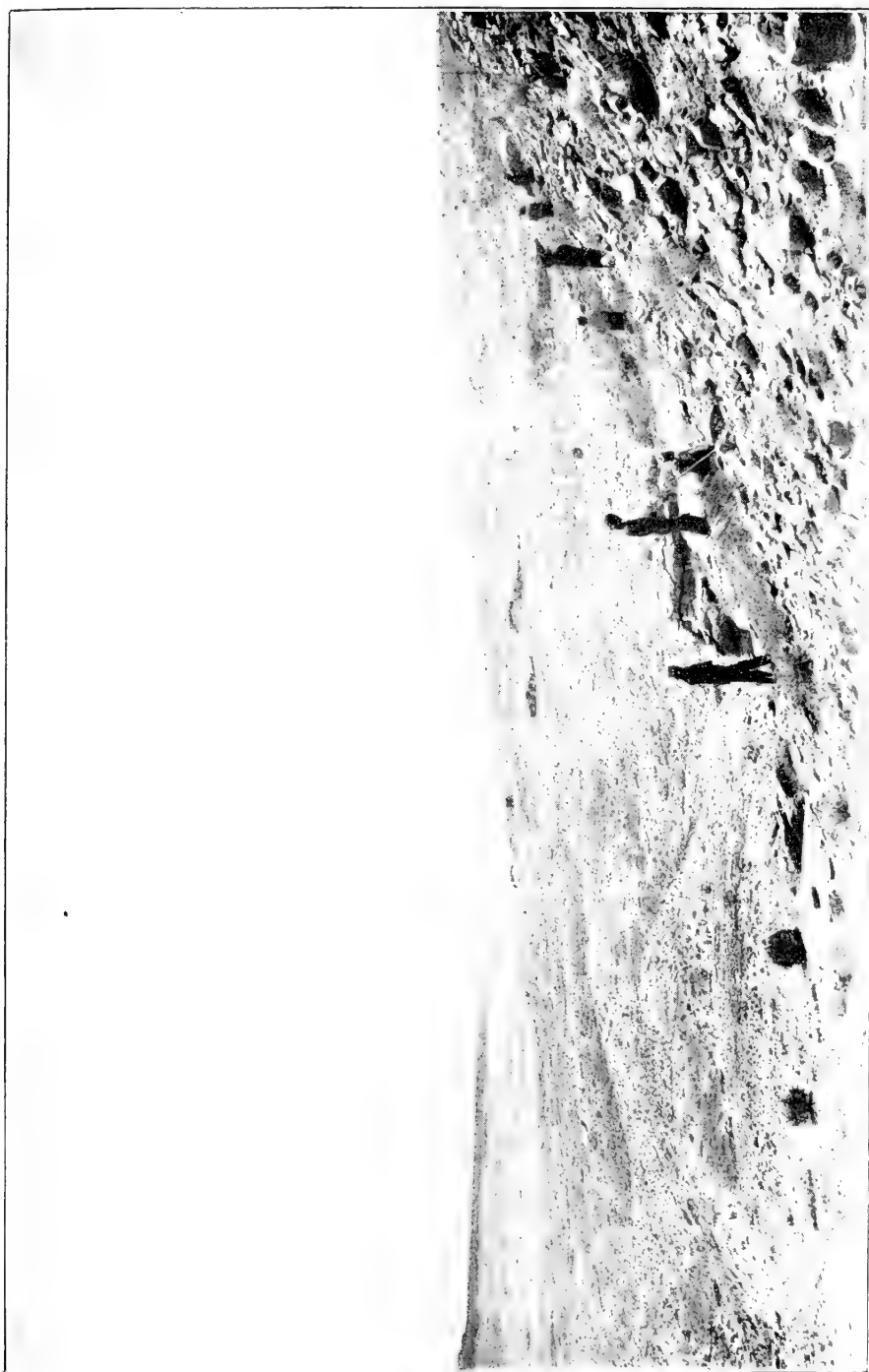


HAIR TIED WITH HAIR CORD.
Kokopnyama, Jettyto Valley, Arizona.



COILED BASKETRY.

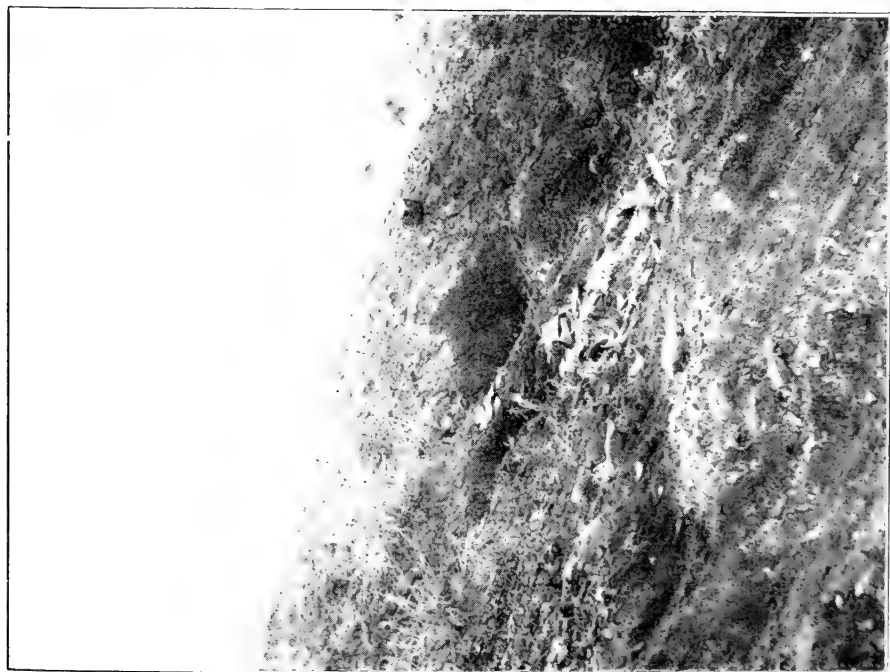
Kokopnyama, Jettyto Valley, Arizona.



GENERAL VIEW FROM KAWAIOKUH,
Jettito Valley, Arizona.



DECORATIONS ON WALL OF ROOM.
KAWÄCKUCH, ARIZONA.



POTTERS' KILN, TWO VIEWS.
Kawaiakuh, Jettyo Valley, Arizona



BURIALS IN HOUSE CEMETERY.
Kawaiokuh, Jettyto Valley, Arizona.



JAR UNDER FLOOR OF ROOM.
Kawanketh, Jettyto Valley, Arizona.



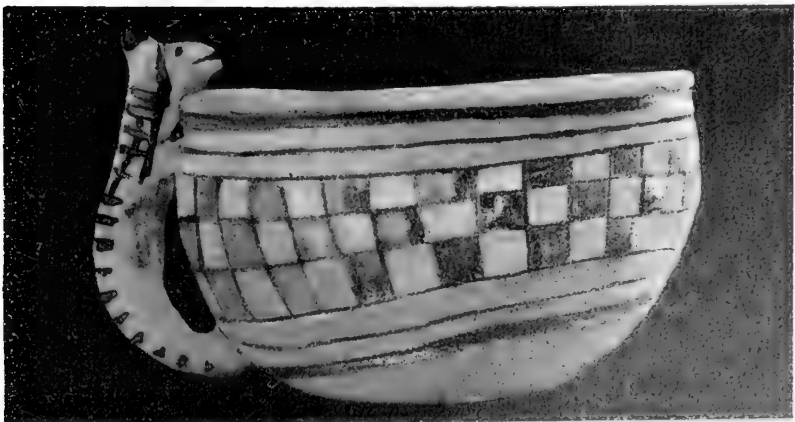
LENGTH, 2 3/4 IN. CAT. No. 21317.



LENGTH, 4 IN. CAT. No. 21318.



LENGTH, 4 IN. CAT. No. 21312.



DIAM. 1 IN. CAT. No. 21319.

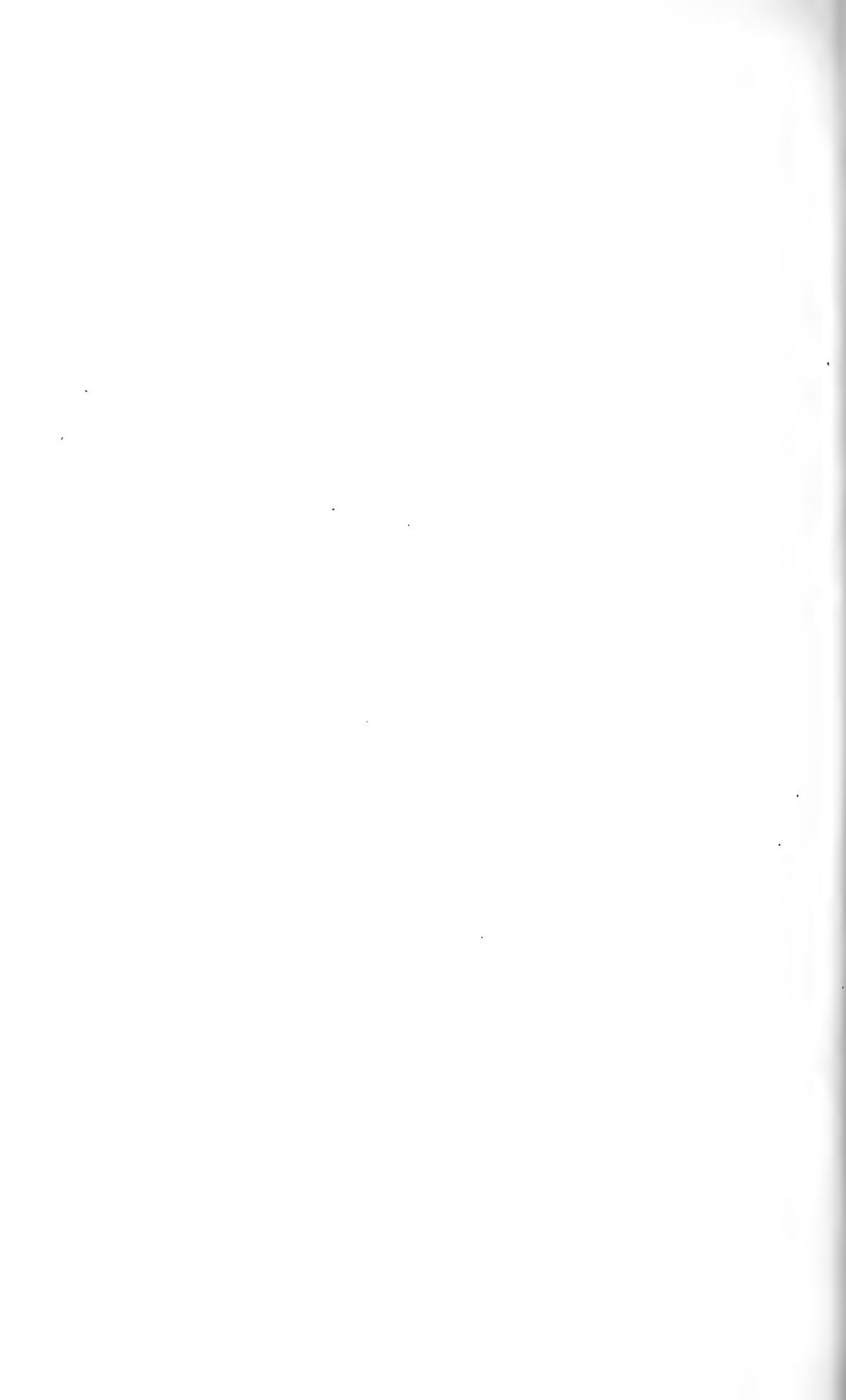
SMALL POTTERY VESSELS.

Found at the site of the ancient city of Mohenjo-daro.





VASE OF PARROT FORM (GATES COLLECTION)
Kawaiokuh, Arizona.



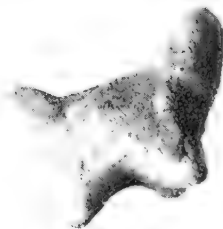
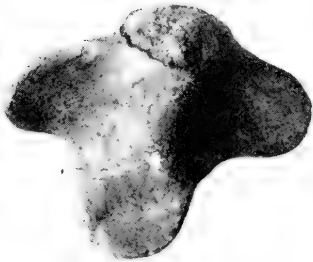
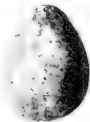
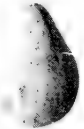
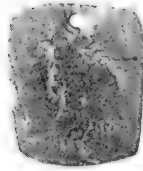
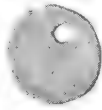


Diam., 7 $\frac{1}{2}$ in.; height, 6 $\frac{1}{2}$ in. Cat. No. 21304.

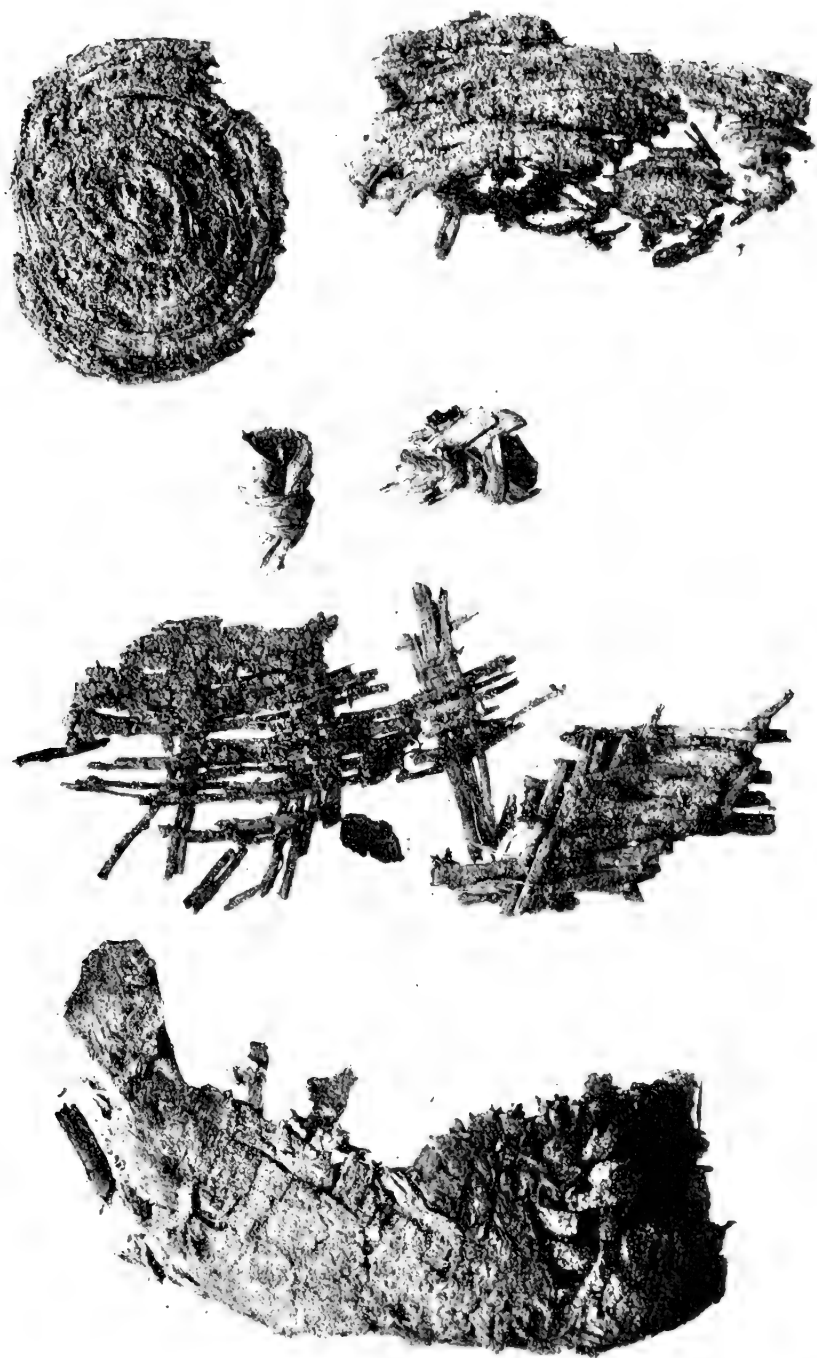


Diam., 8 $\frac{1}{2}$ in.; height, 6 $\frac{1}{2}$ in. Cat. No. 21314.

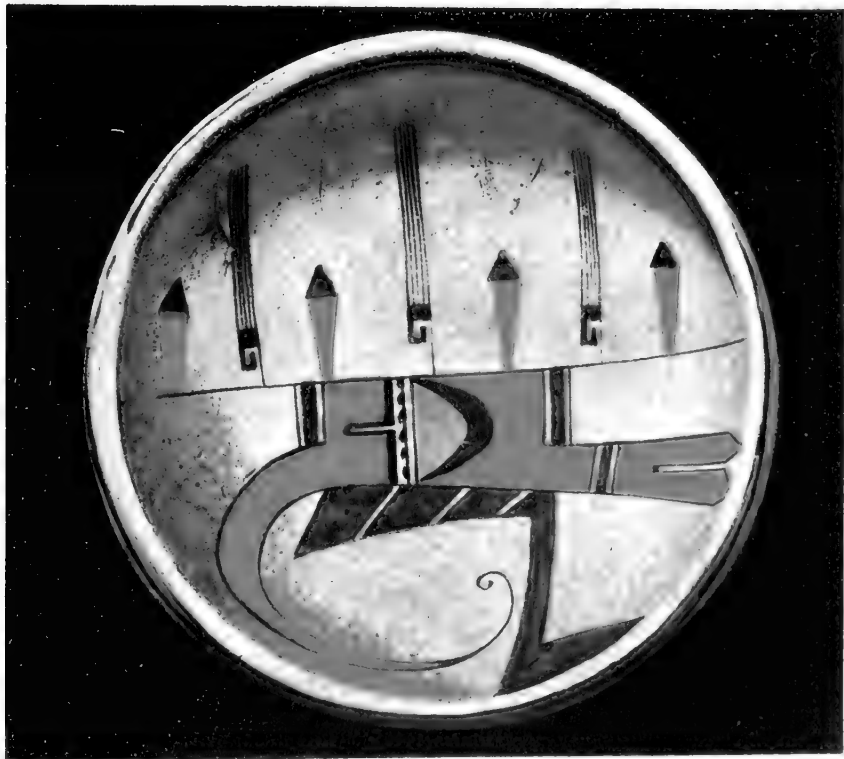
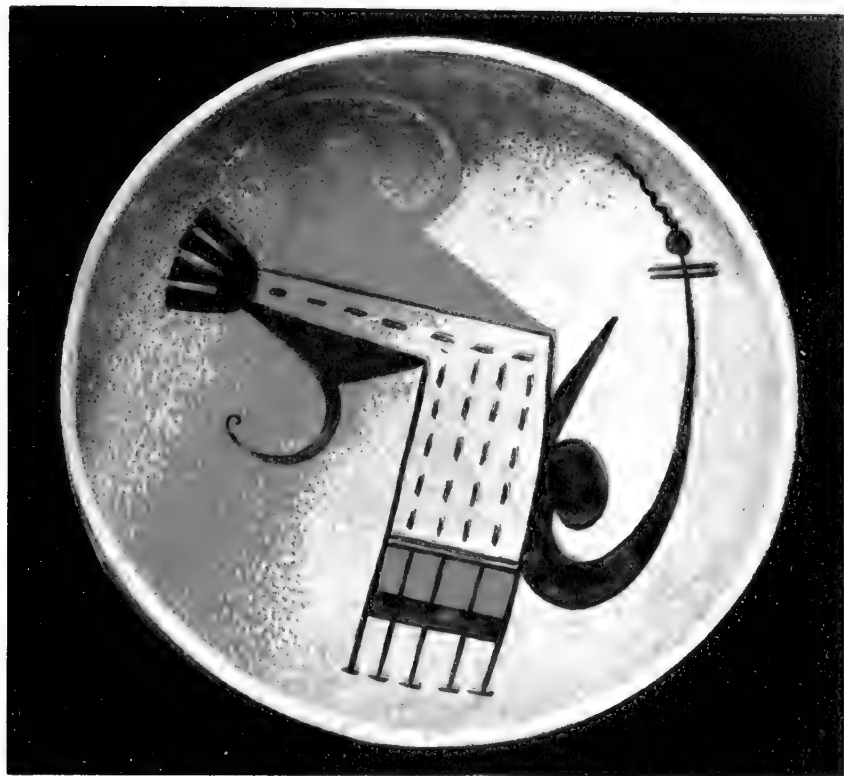
VASES OF GRAY WARE.
Kawaiokuh, Arizona.

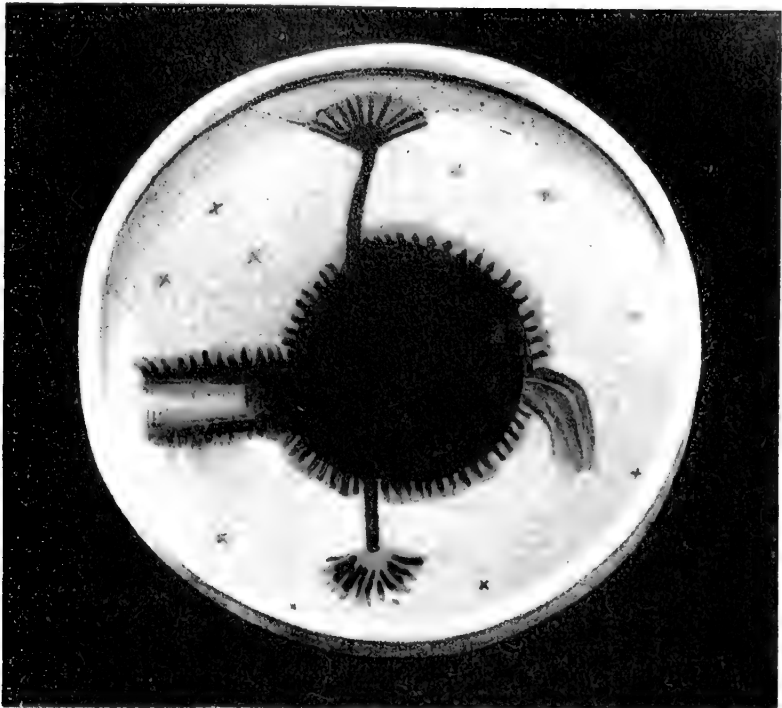


SMALL ORNAMENTS AND FIGURINES.
Kawaiokuh, Jettyto Valley, Arizona.



BASKETRY AND MATTING.
Kawaiokuh, Jettyto Valley, Arizona.





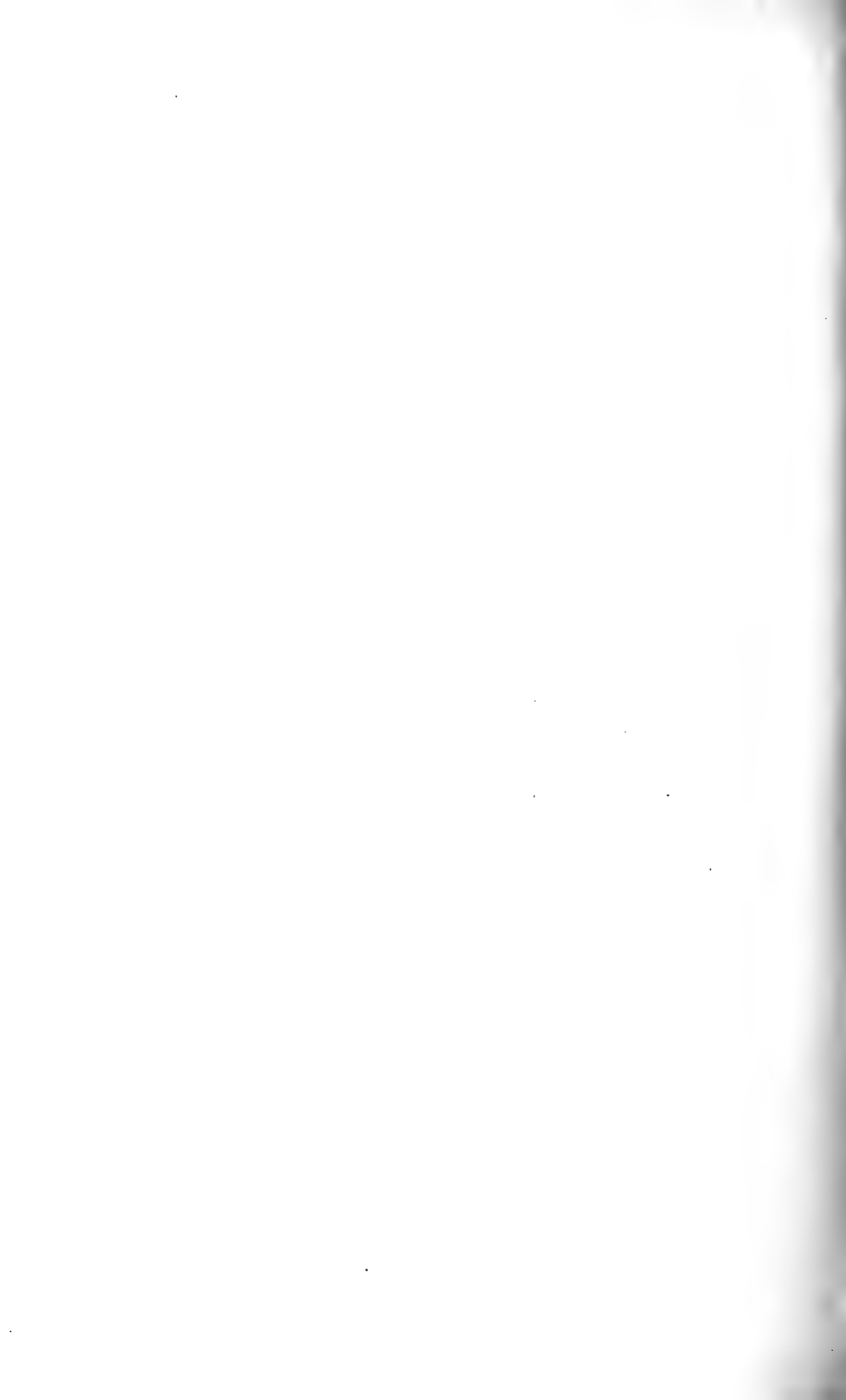
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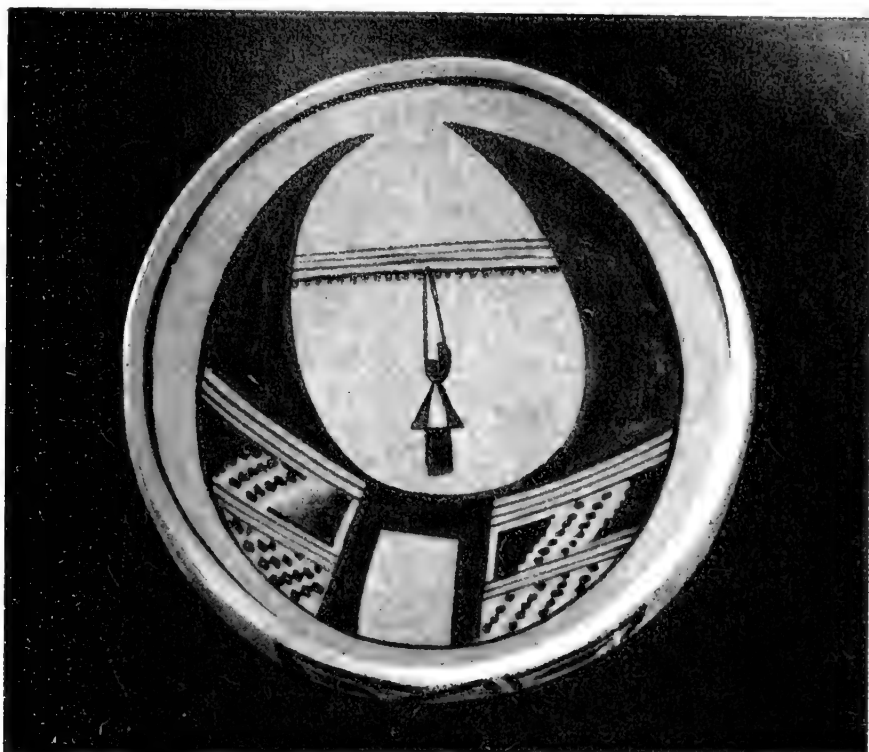


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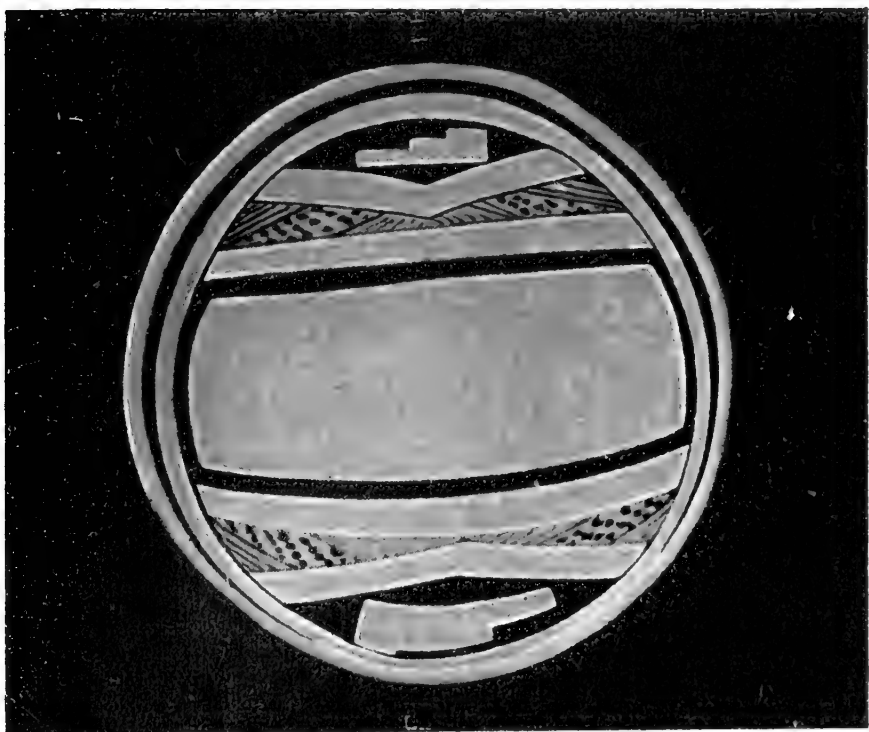
BOWLS SHOWING SYMBOLISM AND COLOR

Kawaiokuh and Kokopnyama, Arizona

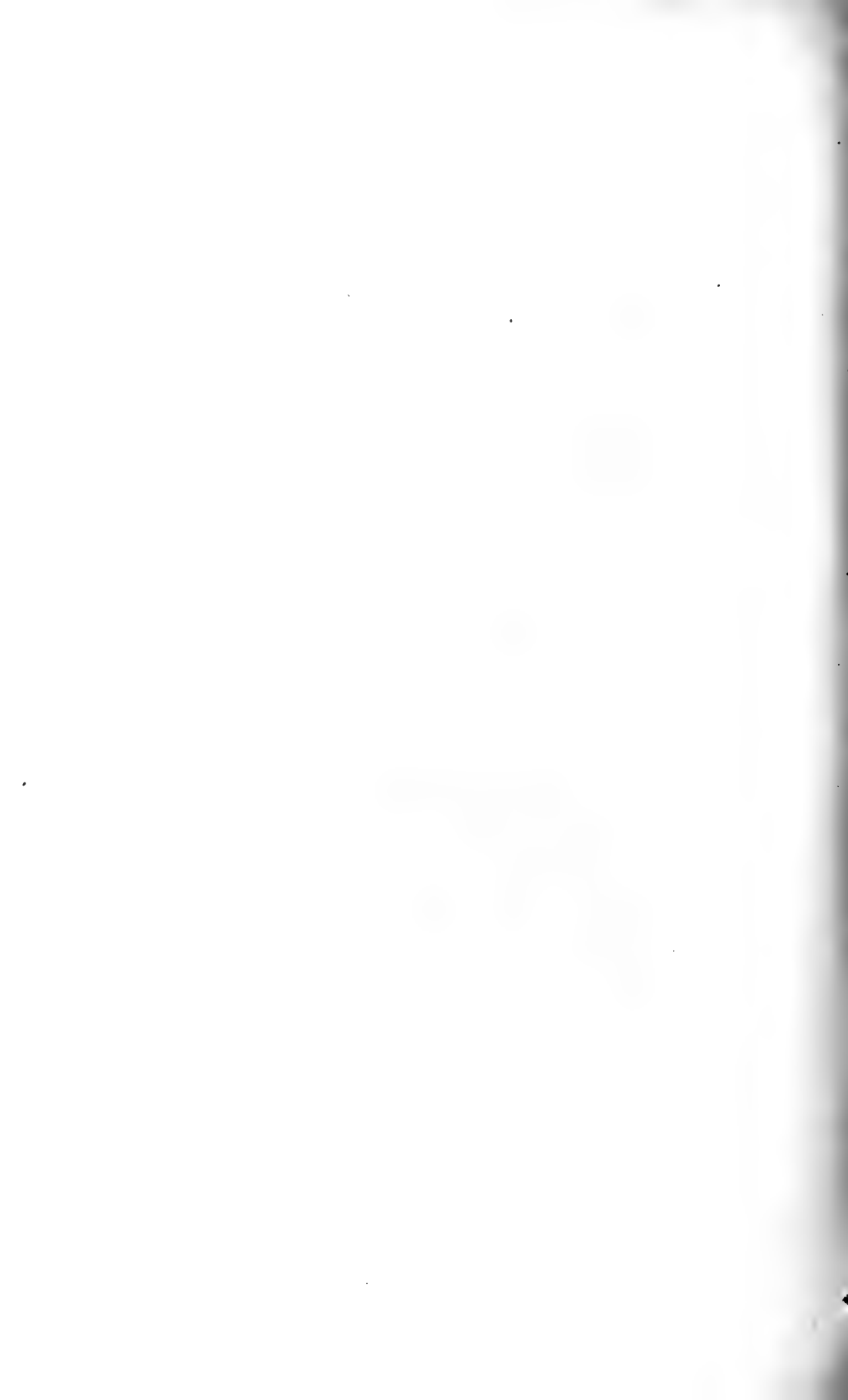




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FOOD BOWLS SHOWING BIRD SYMBOLISM
Kawa Okun-Hi-Juna

NARRATIVE OF A VISIT TO INDIAN TRIBES OF THE
PURUS RIVER, BRAZIL.

BY

JOSEPH BEAL STEERE,

Ann Arbor, Michigan.

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NARRATIVE OF A VISIT TO INDIAN TRIBES OF THE PURÚS RIVER, BRAZIL.

By JOSEPH BEAL STEERE,
Ann Arbor, Michigan.

ITINERARY.

During a recent trip to Brazil I was commissioned by the United States National Museum to make collections in natural history and anthropology, with a view to completing certain series of exhibits for the Pan-American Exposition at Buffalo. The present paper relates to brief visits made to certain native tribes of the river Purús, western Brazil, and the collections and data obtained.

The Mundurucús (Tupian family) of the river Tápajos had seemed the most interesting tribe within reach, but a conference with Dr. Goeldi, the director of the Pará Museum, led to a change of plans. He had made an extended study of the native tribes still existing in the Lower Amazon region, and informed me that the Mundurucús were spoiled for ethnological study by contact with the missionaries and civilization, having lost to a great extent their ancient arts, customs, and language.

It seems probable that no wild tribe now lives on the Lower Amazon or its navigable branches. The ancient inhabitants have in most cases entirely disappeared, leaving nothing but their graves, kitchen middens, and old village sites buried in the forest, and the names of their tribes and ancient territories preserved in the histories of the country and in local names. Most of these tribes have without doubt become extinct, though a few individuals may have merged with the hardier Tapuios (Tapuyan family), the civilized and Christian Indians of the Amazon. Great tracts of the country are entirely without human inhabitants, as the latter generally live in small villages and scattered cabins along the navigable streams only.

Wild tribes still exist on the headwaters of the rivers, where impassable forests and dangerous rapids separate them from the traders and rubber gatherers below. A great war canoe in the museum grounds at Pará and arms, clothing, and ornaments in the museum cases had been recently procured from the Timbýras, a tribe living on the upper

Guamá, a little river running into the bay on the west side of Pará. These Indians are probably now living within 150 miles of the city, but a visit to them would require a strong party and several weeks' time in ascending rapids and dragging canoes.

In 1873 I had visited the wild tribes of the upper Purús River and had found them within reach of steam navigation, so I decided that this place, though so distant, was the most favorable for my work.

After getting as much information as possible from Pará merchants and residents who had visited the Purús, I took passage up the Amazon on an English steamer, and after four days' voyage reached Manáos, at the mouth of the Rio Negro and 1,000 miles from the sea. Since my former visit Manáos had grown from an Indian village to a city of 30,000 people, the capital of the Brazilian State of Amazonas, with street cars and electric lights. Five ocean steamers were at anchor in the Rio Negro in front of the city, and a fleet of river steamers engaged in trade with the Madeira, Purús, Rio Negro, Jurúa, etc.

I was fortunate in getting passage on one of these, the *Antonio Olyntho*, which was about to sail for Acre, on the Bolivian frontier, and intermediate ports on the Purús.

Two days' steam up the Amazon brought us to the mouth of the Purús, now, the 1st of March, rapidly rising with the daily rains. The great sand bars had disappeared and the water was already setting back into the low timber behind. The Purús is noted for its crooked course, there being a decided bend at every 2 or 3 miles distance, and at every bend a great sand bar. These occur with such regularity that the inhabitants are accustomed to reckon distance by so many prayas (sand bars). The banks are generally low, at this season just above water, but now and then the river would strike the high land on one side or the other, this showing generally in bluffs of red clay, some of them 100 feet above the river.

For several hundred miles of the Purús' lower course the forests produce but little rubber and nuts, the staples of the country, and settlements are seen only at long intervals. These settlements consist usually of palm-thatched barracks occupied by fishermen, turtle hunters, and wood choppers from Pará and Manáos. At one of these the steamer drew near the bank, the landing plank was run out to the shore, and two or three cords of dried fish (pirarucú), in great bundles, were brought on board and added to our means of subsistence. At another 50 great river turtles were purchased and the crew sent on shore to bring them from the turtle corral, a shallow pond surrounded by paling. The turtles were thrown on their backs along the sides of the deck, where they lay kicking and sprawling until they also were added to our limited bill of fare.

As we approached the mouth of the Tapaúá, though to the unprac-

ticed eye there was no change in the character of the never-ending forest, the settlements of the rubber gatherers became frequent. The rubber station usually consists of a large building (the *barracón*) generally built of wood or mud and roofed with tile. The lower story serves for a salesroom and for storage, and the upper story for a home for the proprietor (*patrón*) and his family. Around the station are scattered rude palm-thatched cabins, the homes of the rubber gatherers. Though most of the settlements are of this kind, at Canutáma and Lábria towns of several hundred inhabitants have sprung up.

The rubber gatherers are a mixed population, chiefly Tapuio, gathered from all of the older settlements of the Amazon and led here by the hope of making money easily and quickly in the rubber business. Of late years large numbers of people have come up the river from the State of Ceará, on the seacoast, from which they were driven by famine caused by excessive drought.

Near the mouth of the Ituchý the steamer stopped at the little station of San Luis de Cassyaná, the property of Coronel Gomez, who has made his fortune in rubber and is called the king of the Ituchý. Two steam launches for navigating the Ituchý and numbers of smaller craft anchored in front of his *barracón*, with \$10,000 or \$15,000 worth of rubber lying on the bank ready for shipment, were marks of his enterprise and prosperity. Several of the dugout canoes of the Paumarí Indians (Arauan family) were drawn up on the bank (Plate 9), the first signs of aborigines we had seen, and as our freight was carried on shore a half dozen Paumarí women came down and helped carry it to the storehouse. While among civilized people they were dressed like the poorer Tapuios, but were readily known by their small size and peculiar method of wearing their hair, which was cut straight across the forehead above the eyes and allowed to fall loose down the back. They were also marked by a peculiar skin disease, which leaves large white spots upon the hands and feet. The only man among them, after carrying a few loads up the slippery bank through the mud and rain, with the promise of a drink of rum as pay, gave it up in disgust, and getting into his canoe drifted down astern of the steamer, where he sat slapping mosquitoes and watching us until we were ready to start.

On my former trip I had visited these Indians in their villages. Anciently they were much more numerous and are said to have occupied the Purús down to near its mouth. They are now reduced to a few hundred, who are found during the dry season leading a wandering life along the river from the Ituchý to the Cashoeiras (rapids of the Purús). The Paumarí are the best known of the Purús tribes. They are peculiarly river Indians, expert swimmers and boatmen, living almost entirely upon fish and turtles. During the dry season they wander in their little dugout canoes from one sand bar to another, liv-

ing in little oven-shaped huts made by laying narrow palm-leaf mats over frameworks of saplings bent and stuck into the sand. When they move the mats are carried in their canoes, so that they always have their houses with them. In the rainy season, when the sand bars are covered with water, they retire to the lakes, where they live on rafts of dead logs tied together and floored with strips of palm wood.

Their clothing consists of the little apron (*tanga*) common to other Purús tribes. They paint their bodies and limbs in horizontal red stripes. In common with the neighboring tribes they cultivate a little tobacco, and make snuff, which they inhale through hollow bones placed in the nostrils. (Plate 8.) They are a humble, cowardly race, and live in deadly fear of their neighbors, the Hypurinás.

Two days more of slow steaming brought us to Hyutanihan, just below the rapids, and to the end of my journey. This place is on the northwest or right bank of the river in ascending, and at a point where the stream strikes the high land. Part of the village stands on the low ground near the river, and along the water's edge in front is a great pile of wood cut for the passing steamers. A steep climb of perhaps 150 feet leads to the plateau above, where stand a dozen rude palm-thatched cabins of the rubber gatherers, in a clearing of several acres, which is no longer cultivated and has grown to grass and bushes, in which a few immense trees of the Brazil nut are still standing; behind this clearing is the forest. The people, patron and all, were from Ceará, and now, as there was too much rain for rubber working, were busily engaged, some making canoes, others handsawing planks under a shed near the beach, and still others cutting wood for the steamers. Just as I got on shore a canoe drew up to the beach loaded with the meat of a tapir, which was so large that it had been cut in pieces to bring it out of the woods.

I had expected to find villages of the savages within a few hours' distance of this place but discovered that hours would turn into days before I could reach them. There were said to be permanent villages of both the Jamamadí and Hypurinás on the headwaters of the Marmoreá Mirí, a river entering the Purús 60 miles below, but approaching the main stream at this point within 25 miles. A broad trail had been cut across to the Marmoreá from the town, in the search for rubber and nuts.

The agent in charge at Hyutanihan found me a guide, Leocardo, an active young Indian from Ceará, who had been here for several years and had learned something of the country and savages in his hunting expeditions.

Early the next morning we climbed the bluff and began a hurried tramp through the great forest, Leocardo carrying our baggage in a rubber sack to keep it from the rain. The trail led to the west, over high land, which was nearly level, but every mile or two the path

would drop down a steep and slippery bank 100 feet to a narrow valley and small stream, and then rise as sharply to the level above. A little after noon we came out to a new clearing planted with corn and manihot on the banks of a little river, the Apahán. Here were three cabins where lived Senhor Paulo Xavier, the patrón, with three or four rubber gatherers. Senhor Paulo had made the trail we had followed and was well acquainted with the country. He told me that the trail reached the Marmoreá at a deserted rubberstation where I would find no canoe, and that the only trail up the river was now, in many places, over head in water. He said also that the savages were two or three days' journey up the river or as far downstream, and that he had heard that they had recently gone down to near the mouth of the Marmoreá.

Finding myself at my wits' end here, I returned the next morning over the same path to Hyutaniban. I was planning a journey down the Purús to the mouth of the Marmoreá, when just at evening of the second day two men came into the village by the same trail we had followed, one a Cearense, the other a Hypuriná. They were from a rubber station on the upper Marmoreá and were after mail and food. Food was scarce at Hyutaniban, but they purchased a big turtle and prepared to set out for home the next morning. They reported that the Jamamadí were at home in their village on the upper river, but that the Hypurinás had gone downstream. As they said their boat would hold two more, I thought this my opportunity, and hiring Leonardo again, started next morning once more toward the Marmoreá. The Hypuriná, a strong fellow, carried the live turtle, weighing about 70 or 80 pounds, on his back. At noon we were again at Senhor Paulo's, but the Apahán was too deep to ford and the only canoe was up the river. At 3 o'clock the boat returned. It was rather late to undertake the 12 or 15 miles yet between us and the Marmoreá, but Antonio, the Hypuriná, loaded his turtle into the canoe, answering our questions in broken Portuguese that if God willed it we should get through. We were landed on the other side in flooded forest, and wading to the highland, we started almost at a run, as we did not wish to pass the night in the woods. Approaching the Marmoreá we passed through large extents of old clearing, now grown up to small timber, but with clumps of bananas and plantains still fruiting. These were old deserted plantations of the Jamamadí. Just at dark we came out to a clearing on the Marmoreá, here a rapid stream 100 feet wide. A well-built barracón of handsawed lumber and three or four thatched cabins stood near the bank, all vacant. The owner had failed and given up his place and gone down the river to work for someone else.

We passed the night in the empty barracón, Antonio waking us in the night by calling out that he had been bitten by a vampire bat.

The next day was passed in paddling the heavily laden canoe up the rapid stream. In many places the river had risen above its banks and was flowing across from one bend to another through the forest. Antonio, who served as steersman and pilot, made use of many of these cut-offs to shorten the distance, crowding the canoe through among the trees. At noon we stopped on the bank and the men went to an old Jamamadí clearing and brought back a load of sugar cane and half-ripe pineapples to help out our lunch of farina and fish.

Many of the forest trees were bright with red and white blossoms, and a giant convolvulus, with its feet in the water, climbed over the undergrowth on the banks and covered it to a height of 80 feet with immense festoons of pink flowers. The noise of our paddles frightened the game before us, but a great fresh-water porpoise followed us for several miles, frequently rising within a few feet of our boat with a startling splash and grunt.

Just before night we came to San João, the seat of Senhor João Nogueira and the only living rubber camp on the Marmoreá. The station was a new one, having been established but two years, but several acres were cleared along the river and planted to corn and manihot. The patrón, Senhor João, like the rest, was living in a palm-thatched barrack, but was getting out timber for a better house. Several men were at work under a shed making a big canoe to transport his rubber down the Marmoreá to the Purús and market. He seemed glad to see a stranger in this remote part of the world and did his best to make my stay pleasant. My hammock was hung that I might rest after my cramped ride in the canoe, and one of the few chickens he had saved from the vampire bats was sacrificed for my supper. Several monkeys of different species were running about or were chained to the walls. These, he told me, were purchased from the Jamamadí. On hearing that I wished to visit the malocca of these Indians, he agreed to go with me the next day, and we completed our simple arrangements for the trip that evening. It was a two-days' journey by boat up the river, but he thought by taking an old trail through the woods we could make it in a day.

The next morning, taking Antonio and Leocardo, we set out toward the headwaters of the stream, Senhor João, like the Indians, going barefoot. At first we followed a trail made by the rubber gatherers. A mile or so from the station we found a little shed, carefully covered with thatch, beside the path. This was placed over the grave of a little Jamamadí girl who had died while her parents were visiting at the station.

At first the small streams emptying into the river were crossed by logs cut for that purpose, but by and by these failed and we had to wade. Then the streams got deeper and we were soon fording some of them up to the waist, though Antonio did his best to guide us into

the shallower places. About noon Senhor João concluded that we must make the rest of the way by boat. Just then two naked Indians in a curious bark canoe came paddling down through the flooded woods. These were Hypurinás, Pedro Bom, and his brother. Climbing into their boat, we were paddled down to the river to a large open shed of palm thatch where Pedro Bom was living. His wife, as scantily clothed as he, was swinging a sick and crying child in an old bark hammock. Another hammock of three long strips of bark (the primitive type of hammock?) was hanging under the shed. These, with a rough clay pot for cooking, seemed to comprise his household goods. There seemed to be nothing to eat about the premises but a bunch of palm fruits which he had just brought in the canoe; but Pedro climbed to the roof of the barrack and brought down four fish (Matrinchao, an abundant fruit-eating fish of the Purús and its branches). These had been slowly roasted and smoked and dried until they would keep without salt. This process is called "moquiar" on the Amazon, and is probably used by all the tribes. Each of us finished a fish, which with a little farina made us a good dinner, the smoke in the fish seeming to take the place of salt.

Several bark canoes were drawn up on the bank near the shed. These were rude affairs, tied into shape and then dried over a fire; the ends were open and raised but little above the water level. They were made of a single piece of bark taken from the standing tree. The bark of the jukahy is said to be most commonly used. Pedro was easily persuaded to accompany us up the river, and seemed to think nothing of leaving his wife and sick baby alone in the woods. Our party, now numbering five, embarked in one of these canoes, all sitting flat on the bottom, and Pedro finding we were so deep that the water ran in at the open ends filled them with clay.

The river had now diminished to a channel of 20 or 30 feet in width, but rapid and deep and full of fallen timber. Some of this lay just above the water, and we would pull our boat beneath it, all lying down as we passed under; then a log would be just at the surface, and we would pull the light canoe up and over it, all climbing out on the log as we did so.

After three hours of this we reached so much fallen timber that we could follow the river no farther, so we drew our boat to land and went on afoot. Just here were drawn up the canoes of the Jamamadí village. They were also of bark, but much better made than those of the Hypurinás, the ends being raised up and sewed together, forming a hollow beak.

The trail now passed over high land and through large tracts of old clearings of the Jamamadí. Some of these had grown up to timber 100 feet in height, while in others there were remains of the cultivated plants, bananas, pineapples, and pupunya palms. Their method of

cultivation is the one common to all savage tribes of the earth. A piece of the forest is cut down and allowed to dry and then burned. By this means the surface of the ground is made ready for planting. The ground is generally used for two or three crops, but by this time young timber has sprung up from the roots and stumps and taken possession of the land and a new plantation is made.

At 5 o'clock we came out into a clearing of 15 or 20 acres already growing up to weeds and bushes, but with growing sugar cane and manihot and clumps of fruiting bananas, and near the center an immense deserted building, the malocca of the Jamamadí. I had expected to find a village of houses, but this was a great village house (fig. 9). It was a large cone-shaped affair, apparently all roof, 70 feet high and 130 in diameter. As we came near we found that there were neither doors nor windows, but that the roof was raised about 4 feet from the ground all around upon a circle of small posts. On stooping and entering we found that it was made of a skeleton of long poles reaching from near the ground to the peak. To this skeleton was tied the roof of overlapping horizontal layers of carefully braided thatch made from the leaves of the caranai palm. An inner circle of large posts was set 12 feet apart and about 12 feet from the outer walls. These aided in supporting the roof and outlined a series of cells, which served as family dwelling places. A horizontal pole reached from each post to the outer wall. These were placed about breast high and were divisions between the rooms. Inside the inner row of posts the whole center of the building, 100 feet in diameter, was left clear for assemblies and dances, there being no center pole. The building was deserted and there were no signs of recent occupation. Senhor João had told me the story of the tragedy leading to the abandonment.

In June, 1900, only nine months before, this was the home of 130 people and was surrounded by carefully kept fields of corn, sugar cane, and manihot. Then one of the tribe, who had been down to the Purús, brought back measles, caught from the people of a passing steamer, and soon they were dying faster than the living could bury them. When the fever and eruption came on, they would bathe in the river, and this seemed to drive the disease to the lungs and throat and they died of a cough. Finally those who could get away deserted the malocca and fled to the woods, and many died beside the paths and the streams. Señor João described the place, as he visited it about this time, the dead bodies and skeletons lying about, and the arms and clothing of the dead left in their places. After the disease had run its course scarcely 30 were left alive. These feared to return to the village, but settled near by.

After measuring and examining the building as well as possible, we went on, and after a half hour's walk came to a new clearing of 10 or 12 acres. The blackened logs and stumps were buried in tall Indian

corn, now ripe and dry, with the ripe ears hanging on the stalks; among this a crop of manihot was planted and just beginning to grow. Near one side of the field stood three large open sheds of palm thatch, and before these a motley crowd of men, boys, and dogs awaited us. These were the Jamamadí we were seeking. (Plate 2.)

They knew *Señor João* and most of them came forward and shook hands. Some of these were clothed solely in the tanga, others had some bit of civilized clothing, a shirt or a pair of trousers, and one young fellow had on an old Derby hat. The young men had just come in from the hunt, and blowguns and bows and arrows lay scattered about on the ground. The older women remained under the sheds tending their babies or cooked at open fires on the ground. The younger ones seem to have fled to the woods at our coming. The old chief sat in his hut awaiting us. Another younger chief sat squatting on his heels on the ground, naked but for his tanga, and a big red macaw's feather stuck through the septum of his nose and standing out at one side of his face. He was weaving a big basket of vines to serve as a cage for a large gray monkey which had just been brought from the woods and lay at his side, tied hand and foot, snapping and growling at everything near. Several tame monkeys and an opossum were running about the village. A fire was burning on the ground beside the shed we approached, that of the old chief, and one of the women was sitting beside it scraping the roots of sweet manihot, and these were soon cooking in a little clay pot. As soon as it was cooked the dish was brought to me, while the others parched and ate the ripe corn at the fire. This parched corn with game seemed to be the present food of the Jamamadí. The old chief on being asked when they would have plenty of sweet manihot, made the shrill cry of the cicada as answer; that is, that in the dry season when the cicada sang they would feast on the manihot.

Señor João spoke "*lingõa geral*," which was understood by the older men of the tribe. The old chief, under whose roof we had taken shelter, was generally called "*Schau Assúe*," contracted from *Tuchaua Assucar*, meaning Chief Sugar, but he gave his name in his own language as "*Kōmīnch'*," the final syllable being a curious slurred aspirate which was hard to attain. The younger chief was called "*Kīt an ū ě h'*." They were all much interested in our attempts to get a list of words of their language. When we set them to counting we found they appeared to have but three names for numbers, "one," "two," and "ten." Three was "one," "two;" four, "two," "two," etc.

As soon as the cooking was done *Schau Assúe* seated himself at the fire and began making snuff by toasting green tobacco leaves until they were dry and grinding them in a little mortar and mixing this with ashes. Soon all the men and larger boys were taking snuff. Each

was provided with an old percussion-cap box or river shell for a snuff box and a hollow bone of a bird's leg, one end of which was rounded with beeswax and placed in the nostril and the snuff drawn through it. Snuff taking was a matter of importance, two persons being necessary for its proper performance. (Plate 5.) One poured perhaps a quarter of a teaspoonful of the greenish stuff into the palm of his hand, which he then held out to his neighbor, who bent over and with one end of the nose bone in his nostril passed the other along the edge of the snuff, drawing it up with deep breaths.

As night came on pieces of resin were set on fire and placed on upturned earthen pots in each shed for light. Soon two or three of the young men started a monotonous chant, and Pedro Bom, who had already taken snuff with his old enemies, to further show his good will, struck in with a few words of the chorus. Señor João now opened my bale of goods, and soon the whole tribe was gathered round admiring the little looking-glasses and bright-colored handkerchiefs and beads. Finding I would trade for anything they possessed, the women began taking off their bracelets, necklaces, earrings, and tangas and exchanging them for handkerchiefs and looking-glasses. The young men brought out a fine blowgun and bundle of bows and arrows, and the younger chief pulled out the hollow wooden cylinder in his nose with the red macaw's feather and traded it for a little looking-glass and his earplugs for some fishhooks. Even old Schau Assúe sold his mortar and pestle for making snuff and a pretty coronet of toucan's feathers, and his wife pulled off a string of monkey's teeth from her neck and the mother-of-pearl disks from her ears and her bark armlet, and then a beautiful girdle of little river shells, her baby's only ornament. (Plate 4.) I also purchased the clay kettle in which my supper was cooked, and finally an old bark hammock. With this I seemed to have procured a complete assortment of all their worldly goods.

Leocardo had hung my hammock and mosquito net under Schau Assúe's shed, and I now took refuge under it from the mosquitoes, which came in swarms as the fires went down. The children had long ago gone to sleep in the hammocks, but I was awakened by their crying, and I saw Schau Assúe taking down his hammock and with his wife dragging their children into the woods followed by the rest, so that soon I was the only occupant of the village. This seemed to be a common occurrence with this people, to dash into the woods at night and sleep under the trees or in little sheds made for the purpose, thus escaping the mosquitoes, which swarm into the clearings at that time. In the morning at daybreak the people returned to the village.

Kitanũ'ôh now brought a string of skulls of the black peccary to show me what a great hunter he was, and then he gave me an object lesson in their method of hunting. First he showed how they used the blow gun. Taking a broad belt of bark, he drew it closely about his body

beneath the chest, and wrapping the end of a little poisoned arrow with silk cotton to make it fit the bore of the gun, and filling his lungs, he blew the arrow into the top of a tall tree standing in the edge of the forest near by. (Plate 6.) Then, taking his blow gun and bows and arrows on his shoulders, he bent down and silently crept through the forest, looking carefully on every side, and then catching sight of the game dropped the blow gun and, sorting out three arrows, shot them rapidly into the bushes. Going where the arrows struck, he made marks on the ground with the tips of his fingers to represent the tracks of the wounded game; and following these a short distance he stooped over and spread his hands before him, palms down, to show where the game lay, dead. Señor João asked Schau Assúe to show us how the different birds and beasts sang, and he gave us the notes of the parrots and toucans, then the cries of the tapirs, peccaries, and monkeys, all with wonderful likeness to life. Then he made the strange, rattling roar of the jaguar so vividly that it made one's flesh creep. They make use of this art of imitating the notes of the animals in their hunting. Our Indians, the Hypurinás, had filled their baskets with the ripe corn, apparently without taking the trouble to ask leave, and, taking a young Jamamadí with us to carry part of our load to the river, we set out on our return.

As near as I could learn, the Jamamadí are now reduced to two or three small settlements like the one we visited, all on the Marmorea Mirí, which is their ancient seat. They appear to have first come in contact with the rubber gatherers and civilization about thirty years ago, but in this time have become greatly reduced in numbers. Though having many customs like those of the neighboring tribes, they differ from them in language, in using the blow gun, in the form of their dwellings and their canoes, in the character of their headdress and other ornaments, and doubtless in many other ways which a longer stay would have made manifest.

On reaching the river and again embarking in Pedro Bom's bark boat a heavy rain storm overtook us, lasting until we had nearly reached the station of San João.

This station is rich in india rubber, there being rubber paths for 50 men already opened, with room for 50 more. But Senor João had but 15 or 20 men in his employ and little chance for getting more, as the station is 50 miles from even the rude settlements of the Purús below. The location also seemed to be unhealthy, as some of his people were suffering with fever. I left what quinine I had for those with fever, and some white soap for a poor fellow whose legs were covered with ulcers caused by the bites of mosquitoes and sand flies.

On our way down the Marmoreá from San João we visited a malocca of the Hypurinás. This was 2 or 3 miles from the river. The owners were away down the river on a hunting expedition, except Pedro Bom, who had gone up the river where we had found him.

The village consisted of three communal houses. These were much smaller than that of the Jamamadí and only fitted for three or four families each. They were oval in shape, 25 to 30 feet in height, with roof coming to the ground all around. There was a door in the center of each of the two longer sides, with pieces of thatch to be placed against them in time of storm. Everything was much ruder and more carelessly made than in the Jamamadí house.

The Hypurinás are the most numerous and most warlike of the tribes in this region. I could get little idea of their numbers, some of their villages being said to be still unvisited by civilized people. Their presence on the Marmoreá was probably as parasites to prey on the weaker but more industrious Jamamadí. I saw nothing of them in 1875 on this river, and their appearance there is probably recent. They are hunters and fishermen and also cultivate the land. There appears to be no question but that they are cannibals, eating the flesh of their enemies killed in battle. They live in small communities, on the smaller streams of the interior, but keep up communication between their villages, and gather from these to a common center for their great feasts and dances.

Our return journey on foot from the Marmoreá to the Purús was made more difficult by the collections we had made, among these being a large gray monkey in his cage and a bundle of arms from the savages. The latter fell to my lot to carry, but because of its length it continually struck the trees and undergrowth on the sides of the path. A day of heat and rain and hurry found us again at Hyutanihan ready for the steamer.

THE HYPURINAS.

The Hypurinas^a (unclassified) are forest Indians. Those studied were living in small villages upon narrow streams flowing into the Purús from the west, below the rapids. They reach the territory of the Jamamadí and Paunari' (Arauan family) on the Marmoreá Mirí and about the rapids of the Purús, though but little idea was gained of their distribution or numbers. The settlers say that there are villages still unvisited by civilized man. Their language seems to have no verbal similarity to those of the other two tribes to be studied.

They are much stronger mentally and physically than their neighbors and better able to cope with the type of civilization which has reached them. Some of them are employed in rubber camps and as servants, and several have reached Pará in this latter capacity. They dress in the tanga, as do the neighboring tribes, and go bareheaded and barefooted. Those near the settlements had thrown away their native arms and had procured cheap guns from the rubber-gatherers

^aChandless, Proceedings of the Royal Geographical Society, London, 1889, p. 501.

as far as they were able. They have the same habit of snuff-taking already described for the Jamanadî and the Paumari'. They were cannibals up to the time of the settlement of the river, and the custom is said to be still retained in the villages not yet reached by civiliza-

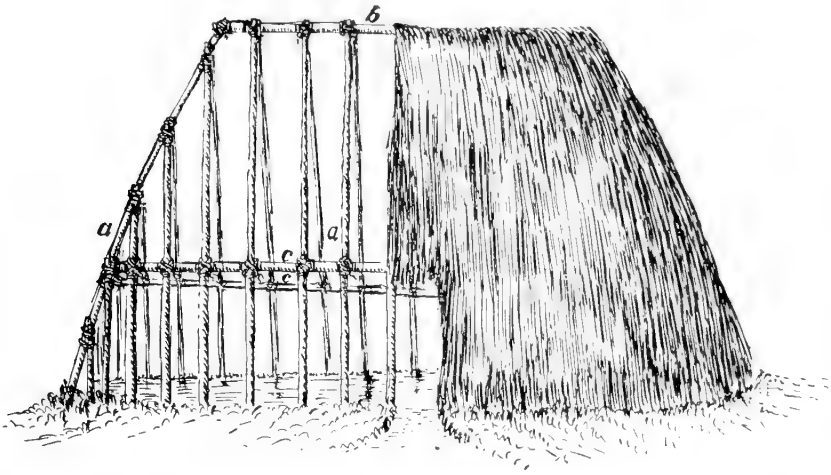


FIG. 1.—Side elevation of Hypurina Indian house. *a*, rafters; *b*, ridge pole; *c*, hoop supporting rafters.

tion. Though warlike, they have never attacked the intruding settlers, as the wild tribes about the rapids of the Madeira have done.

They sleep in bark hammocks. One was seen in use among them made of three long, broad strips of bark, tied together at their ends. They preserve the bones of their dead, wrapping them in bundles and hanging them to the roof of one of their houses, deserted for the purpose.

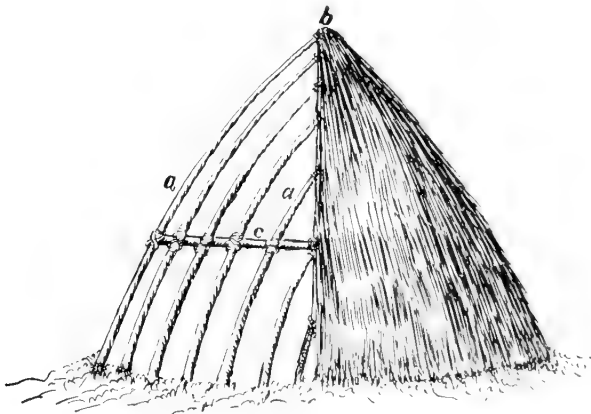


FIG. 2.—End elevation of Hypurina Indian house. For lettering, see fig. 1.

The village visited consisted of three houses, each fitted to hold three or four families. These were oval in shape, or rather were made with two straight parallel sides and rounded ends. They were about 25 by 40 feet in diameter (fig. 1). There was no distinction of wall and roof, the roof of thatch coming to the ground. The framework was

made of long slender poles stuck into the ground and tied above to a ridge pole; this was covered with horizontal and overlapping layers of palm-leaf thatch, the strips being tied by vines to each rafter (fig. 2). A door was left in the center of each side; these were closed with strips of thatch. Low half-moon ridges of earth were heaped up inside of each door to prevent the entrance of water. A little room about 6 feet square was cut off at one end by walls of thatch. Five little heaps of ashes and firebrands around the walls and several posts for hanging hammocks showed where the different families made their homes (fig. 3).

Their method of cultivation is like that of the Jamamadí already described, but their fields are much smaller and less carefully tended.

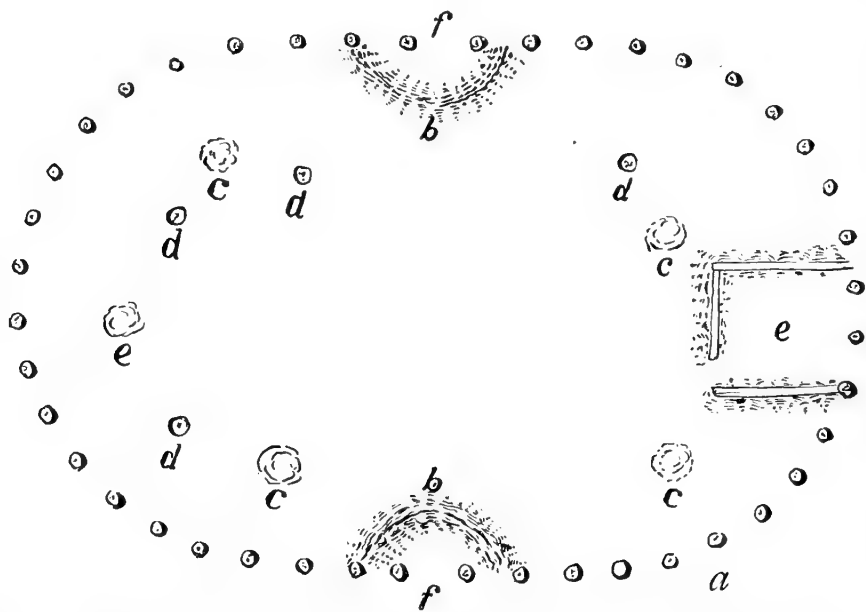


FIG. 3.—Ground plan of Hypuriná house. *a*, foot of rafters; *b*, mound of earth inside of door; *c*, fireplaces; *d*, posts for hammocks; *e*, room; *f*, door.

They depend much on hunting, and especially on fishing, for a living. The family of the Hypuriná, Pedro Bom, were living on fish when visited. One of their methods of fishing is with a basket attached to a spring pole; this is set and baited under water. The fish caught are dragged out of the water head down, so that they can not escape (figs. 4 and 5).

They frequently all leave their villages on extended hunting and fishing excursions, living during this time in open sheds of thatch (*papíra*), which are built wherever they stop for the night. Their canoes are each made of a single piece of bark, like those of the Jamamadí (fig. 12), but they are more rude and the ends are left open. They are probably never used for navigating the Purús, serving only for the narrow streams flowing into it. Several villages are accus-

tomed to gather together for great feasts. These are accompanied with music, dancing, and rude acting. In these they make use of

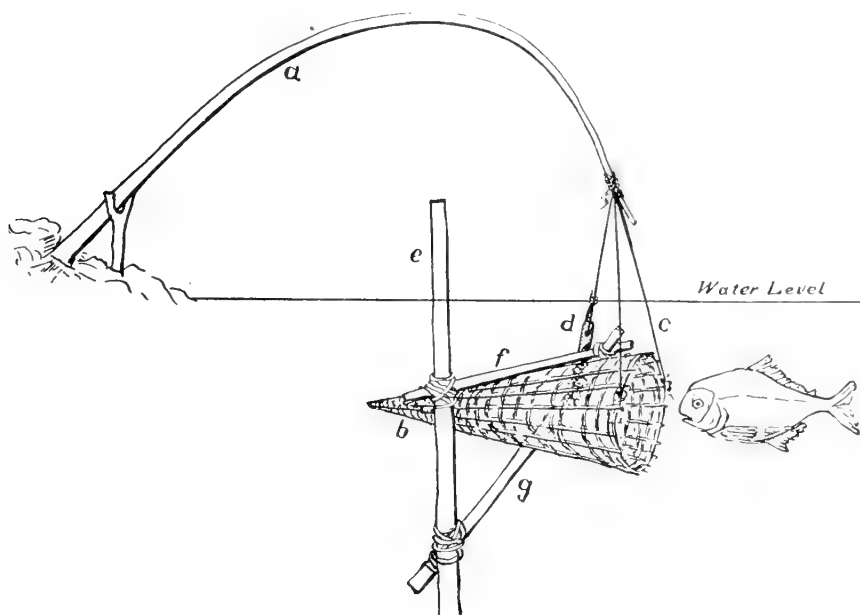


FIG. 4.—Fish trap of Hypuriná Indians. *a*, spring pole; *b*, fish basket; *c*, bait of fish basket; *d*, trigger; *e*, post planted in the water. *f*, *g*, supports tied to *e* under water to hold *b*.

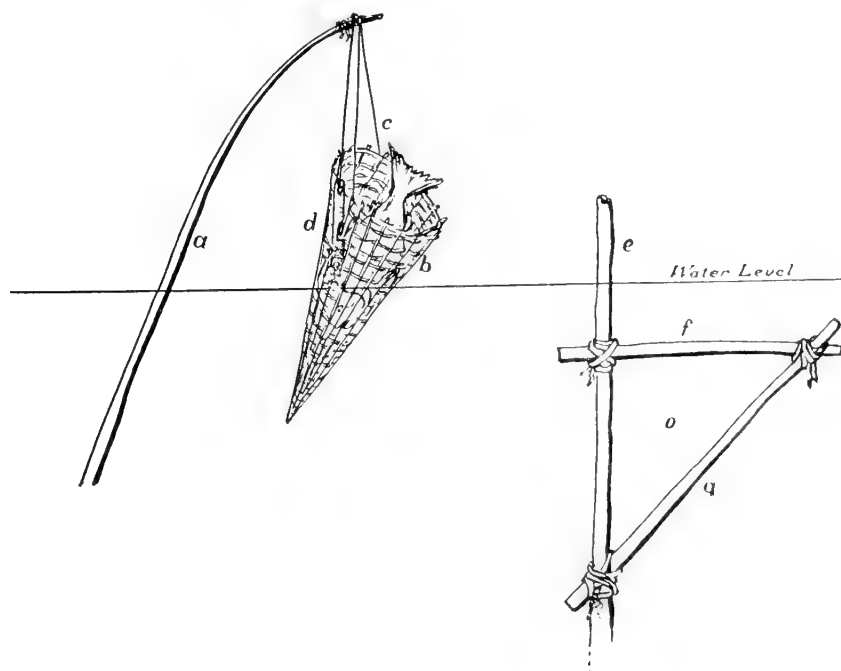


FIG. 5.—Fish trap of Hypuriná Indians. For lettering, see fig. 4. *a*, opening in which basket is secured and set.

rude wooden figures of birds and other animals, and imitate their notes. (Plate 1.) Their musical instruments are wooden drums, and

horns and trumpets of bark and hollow cane. The songs procured were generally of war. The following are the text and translation of some of them. (For music see figs. 6 and 7.)

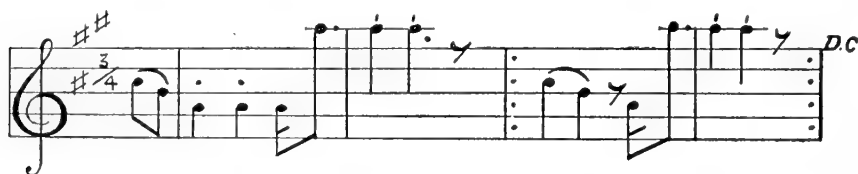


FIG. 6.—Hypuriná Indian war song.

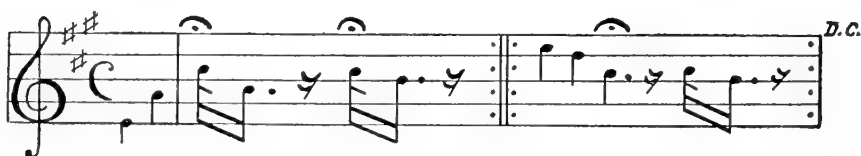


FIG. 7.—Hypuriná Indian girl's song.

SONGS OF THE HYPURINAS.

1. iwāhā nīšipīngā nīpīnā pūrī pānī': I go down below (down the river), who knows whether I shall return—or die there.
2. kōnāi itākūrī mākokwā' wīchī mīngānī: When the macocaua sings it sings well.
3. shāmbānā ūmbārī kīrāpārā hīnī shāmbānānī: The leaf that calls my lover when tied in my girdle.
4. mārākūmbī mākulīnā pōngātā mārākūmbī hātīnīrī sāwākī' pōngātā: Bring your arrows, I am a warrior. I have my arrows ready and wish to kill you.
5. nāwī mārī kōnīpī' mārūtārī nāwī mārīnā pārī': Now no one can say I am not a warrior, I return victorious from the battle.
6. kākōtīrī nāpīrī kāiūtīpānā' pērītī: I am a serpent, when I bite my enemy dies.
7. wāinī kīū kānānīpānī yūlmā pānī kānū: I go to die, my enemy shall eat me.
8. kā wīrītū kōowārū kosānātī wākūrī shīnīnē: I am wounded in the fight, but I shall not die.

LIST OF WORDS FROM HYPURINA.

The first column of names of parts of the body was taken while there were several of the tribe present to correct it. The second column was taken from a boy who could speak nothing else. The other Hypurinas said this list was from a dialect called (Sīngānānērī'), that of the toucan-clan or people.

Both lists of parts of the body seem to have the personal pronoun (I or my) in composition, in the first prefixed nī' or nī'u, in the second suffixed āchī' or ānchī'. Thus: tō hū(n) or tāwān, the forehead, gives, first, nītōhū'(n); second, tāwānchī'. Pōtō or pōtū, the mouth, gives, first, nīpōtū'; second, pōtōnchī'. Kītī', the foot, gives, first, nīkītī', and, second, kītīnchī', etc.

head: ikīwī'	nose: nīkīrīpī'—kīrīnchī'
hair of head: kīwīshākī'—kīwīshīkēchī'	mouth: nīpōtū'—pōtōnchī'
forehead: nītōhū'(n)—tāwānchī'	inside of mouth: nīnāmāhā'
ears: nīkīmbī'—kēmbīshīchī'	tongue: nīnīnī'—īnānī'
eyes: nīnōkī'—ōkī'	teeth: nīserīhī'(n)—serīnchī'

beard: shiwāpātō'—shāmbōtō'
 neck: nñōpī'
 breast: nñtōrōtā'—tōrōtānchī'
 shoulder: nñsōtārītā'—sūtārītānchī'
 arm: nñkānōkī'—kānōkīnchī'
 hand: nñwā kūnūtā'—wākūnchī'
 finger: biōkīchī'
 finger-nail: nñsāwātā'—sāwātāichī'
 heart: nñānkīpā'—ānkūpāichī'
 stomach: nñtūrūmā'—tūrūmānchī'
 blood: nñhīringā'—ārānkāchī'
 thigh: nñpōrīnā'—pōrōkānchī'
 leg: nñtāpīkī'—kāpīkānchī'
 knee: nñpōtōrīkī'—pōtōrākīnchī'
 foot: nñkītī'—kītīnchī'
 toe: nñkītīkī'—kītīkī'
 toe nail: nñsāwātā'—sawataīkīchī'
 God: ———
 devil: Kāmīrī'
 man: kīkī'
 woman: sītū'
 husband: nñdānīrī'
 wife: nñdānīrū'
 boy: nātā kūnī' wākūnī'
 girl: nātā kūrū' wākūrī'
 father: nīrī'
 mother: nātū'
 son: nāmārī'
 daughter: nñhātīrū'
 brother: nñpīrī'
 sister: nñtārū'
 chief: tūshā'wā
 dog: hāngītīkī'
 hen: pātārī'
 tapir: kīāmā'
 fish: shīmākī'
 scale: ōtāntā'
 tail of fish: ōshītā'
 bird: kōtī pīrīkī'
 feather: īmñgī'
 wing: īkīrītā'
 beak: īmñgītā'
 snake: īmñī'
 frog: tūrūtī'
 turtle: kūmbīrī'
 turtle shell: kūmbīrī' ōtāhā'(n)
 egg: nākī'
 deer: mānītī'
 otter: ēñlārī'
 paca: kīātī'
 duck: ōpāi'
 toucan: sñngānī'
 tree: īmīnā'
 vine: āhā(n) pīsā'

leaf: āhā sūpā'
 branch: āhā pōrī'
 root: āhā kōsā'
 flower: āhāwī'
 fruit: kārīpīnkā'
 tobacco: āwīrī'
 banana: sīpārī'
 sweet potato: chīpālī'
 corn: kēmī'
 cotton: nāpōāchā'
 rum: kāwī'
 stone: kāisūnī'
 sand: kīpāchī'
 bow: tāpūchī'
 arrows, war: mākūrīnā'
 arrows for fish: sīrī pīchī'
 bow-cord: tāpū chīchā'
 blow gun: īkānā'
 axe: kētaīī'
 spear: kāwādā'
 knife: īwātā'
 pot: kōpītī'
 canoe: āhātā'
 paddle: mēkūchī'
 hammock: kīkōchī'
 house: āwīkū'
 mat: kōchītā'
 water: īmbōrāhā(n)'
 river: wēnī'
 rain: īmbōrāha(n)'
 sun: ātōkāchī'
 moon: kāsīrī'
 stars: īwīrīkī'
 night: īngīātā'
 dark: māpīāhā'(n)
 morning: pākāmārā' pīsā'
 day: pākāmārā'
 fire: shāmīnā'
 smoke: shāmīnā' sīnī'
 ashes: shāmīnā' īchīkū'
 bone: āpī'
 large: nūtāhōwītī'
 small: wāshāngītīkīkā'
 cold: kāchīngārē'
 hot: kāpūtākā'
 good: hārārī'
 bad: kōnāhārā'
 sweet: pūchūā'lī
 sour: kāchīūrī'
 bitter: kīpīshī'
 tall: ītanū'
 short: kōnūtānūrī'
 round: īpōkītā'
 sick: āmīānātā'

lame: māhītūrī'
 blind: kona kōwkinī'
 asleep: ūmā kāpikā'
 distant: ōtākūlī'
 near: kōnaitākūlī'
 wet: ihāngā'
 dry: ūpīpīngā'
 to kill: nōkārī'
 to cook: nāshītā'
 to eat: nīnikā'
 to drink: nihātā'
 to fish: nīsāpīhātā'
 to hunt: āiātā'
 to walk, to go: nīsīpīngā'
 to die: wachānīpē'mbi
 to cry: nīchīhī'ntā
 to laugh: nīsīrī'
 to talk: nīsāngīrē'

to sing: nīshīpōātā'
 to sleep: mīnāpē'
 to smoke: nāwīrī pīhā'tā
 one: hātikā'
 two: ūpīkā'
 three: ūpīpākīnī'
 four: māpākā'
 many: ūtūrī'
 I: nōtā'
 thou: pītā'
 he: hātārī'
 we: ātānānī'
 no: kōnā'
 yes: ārī'
 to-day: wāchārī'
 to-morrow: ātānā'
 yesterday: kītā'

THE JAMAMADÍ.

The Jamamadí are a small tribe of forest Indians, apparently limited to the vicinity of the Marmoreá Mirí, a small stream entering the Purús from the southwest, at about latitude 8 south, longitude 67 west from Greenwich. A further study of the Indians of this region may prove them to be an isolated group of a more extended tribe. Their language is related to that of the Paumarí (Arauan family). Their name seems to be from the Paumarí and to mean "wild men" (*jūwā-māgī*).

In 1873 the pioneer rubber gatherers on the upper Purús had just come into contact with them.

At this time (1901) they seem to be reduced to two small villages, one on the upper Marmoreá and the other near its mouth, and they do not number probably more than 100 persons in all.

The village visited had been so nearly destroyed recently by pestilence that but a faint idea could be gained of their normal condition. They had two chiefs or headmen, but these seemed to have little power over them. Like the neighboring tribes, they go naked but for the tanga, this being a little apron of cotton threads, colored red with anatto, and 3 by 4 inches in size for the men and 3 by 6 for the women (see fig. 15). It is supported by a bark cord around the loins. This cord is hidden by the women under a belt of cotton or bark cords as broad as the three fingers and colored red.

Both sexes pierce the lobes of the ears and the septum of the nose. The men wear little plugs of reed or resin in the ears. The women use as ear ornaments little disks of mother-of-pearl fastened to small cords, which are drawn through the ears and secured behind the head, the disks thus showing in front of the lobe (Plate 4, fig. 4). Both sexes use little hollow pieces of wood in the nose. The younger chief

had placed in this nose cylinder a long red macaw's feather, which thus stood out at the side of his face (Plate 4, figs. 7 and 8). Their hair is allowed to fall down in front and is cut straight across the forehead about 2 inches above the eyes. The hair of the temples is allowed to fall to the level of the eyes, where it is cut straight to the ear. The hair behind is cut at the neck. The men have a narrow mustache and a few bristling hairs on the chin (Plates 2 and 3).

The men generally wear a narrow belt of cords with a tassel of feathers or anta's (tapir's) hoofs at one side (Plate 4, fig. 3). The women wear necklaces of monkey's teeth and bright shells (Plate 4, figs. 5 and 6) and armlets of white beads and bark. On feast days the men wear curious crowns, shaped like a hat brim. These are about $2\frac{1}{2}$ inches in width and made of palm leaf, with warp of bark cord. To the outer edge of this is attached a fringe of red and black toucan feathers (Plate 4, fig. 1). This is worn like a crownless hat, the top of the head standing up through it. The chiefs are distinguished from the others by wearing a crown made of numerous tassels of red and black toucan's feathers fastened by short cords to a narrow band about the head (Plate 4, fig. 2).

In common with the neighboring tribes they are snuff takers. This habit is general among them, the women using it also, but not so often nor so openly as the men. The green tobacco leaves are toasted upon the bottom of a clay pot (Plate 5, fig. 3) turned over the coals. They are then tentered out on sticks over the fire until they are perfectly dry. The mortar is made of the shell of the Brazil nut (Plate 5, figs. 1, 2, and 8), the pestle of heavy wood. The mortar is partly filled with live coals, which are shaken in it to thoroughly heat it without burning. Then the leaves are pounded and ground into the finest dust, which is of a greenish color. The red bark of the root of a certain shrub is scraped to clean it of dead bark and earth and is then burned and the ashes carefully collected and mixed with the snuff in about equal parts.

For taking the snuff they are each provided with a hollow bone of a bird's leg, this being about 5 or 6 inches long and one-fourth inch thick (Plate 5, figs. 4, 6, and 7). One end is rounded with beeswax to make it fit the nostril. The snuff is carried in boxes made of river shells (*Ampularia*) (Plate 5, fig. 5), but several of the young men had procured percussion-cap boxes of the rubber gatherers. Snuff taking was a matter of importance with them, two persons being necessary for its proper performance. One of these put as much as a half or a fourth teaspoonful of the snuff into the palm of his hand and held it out to his neighbor, who placed the rounded end of the bone in his nostril and, stooping over, drew the other end slowly along the edge of the snuff, drawing it up with deep breaths, then changing to the other nostril. After he had finished he drew a long feather through the

bone, that nothing might be lost, and then offered his palm and snuff to his friend, who went through the same performance. The others who were near watched the performance with interest, making remarks as it proceeded. The one who holds out his palm stands perfectly motionless during the snuff taking.

The permanent residence of the Jamamadí is a great conical, communal house, fitted with cells or rooms for all the families of the village. These are arranged in a circle within the outer wall of the building, leaving the center clear for dances and assemblies (fig. 8).

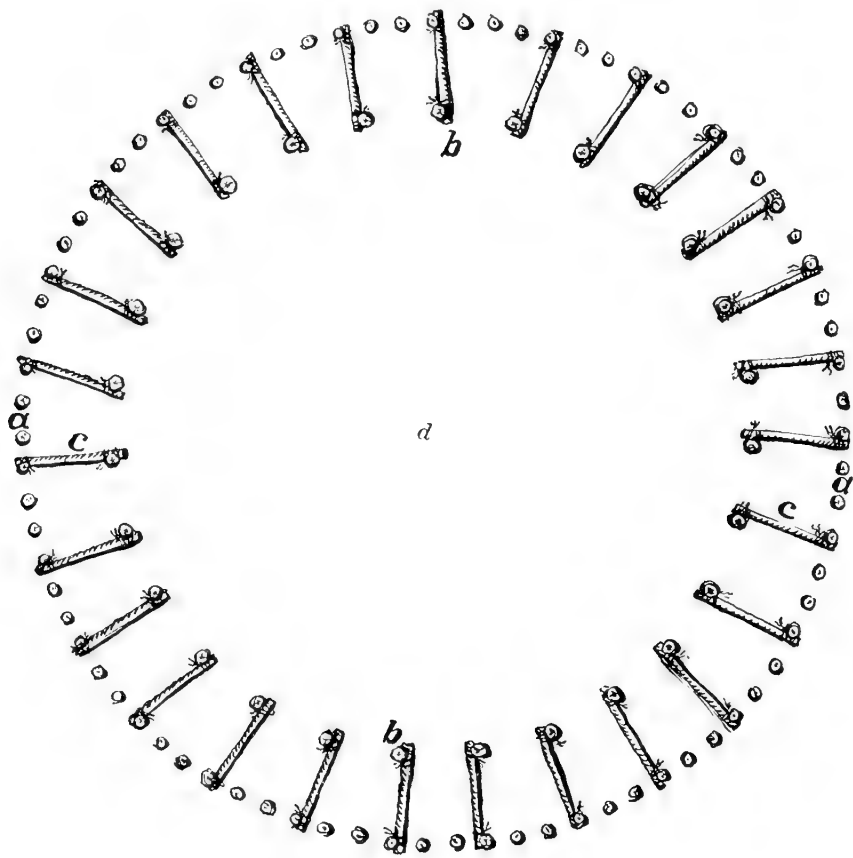


FIG. 8.—Ground plan of Jamamadí Indian house. *a*, outer posts; *b*, inner posts; *c*, room; *d*, inner open space.

The building visited was about 130 feet in diameter and about 70 feet high. The framework consisted of 100 small posts, $4\frac{1}{2}$ feet high and about 4 feet apart. Near the top of these posts a strong hoop of poles was fastened, being tied with vines to each post. Inside of this outer circle of posts, at a distance of about 12 feet, a second circle of stronger posts was set, about 14 feet high and 12 feet apart. The tops of these posts were notched, and in these notches a second hoop of poles, tied end to end, was placed. Long, slender poles, rafters, were now lashed at their larger ends to the bottom hoop about 2 feet apart and leaned

upon the inner hoop toward the peak of the building (fig. 9). A few of the longer ones reached the peak above, where they were fastened together (fig. 10). Upon this skeleton was tied a roof of thatch. This was made of strips 2 feet in width and 8 or 10 in length of the leaves of the caranaí palm, split, and braided over a narrow piece of wood.

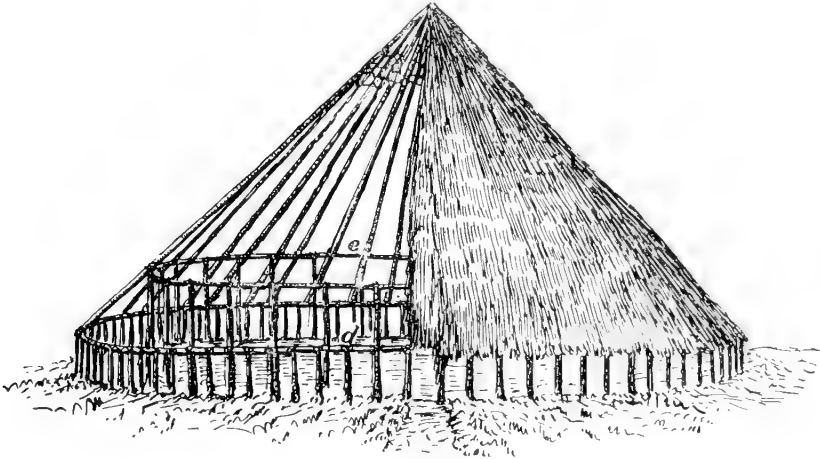


FIG. 9.—Section of Jamamadi Indian house. *d*, lower hoop; *e*, upper hoop.

The first course of thatch was laid upon the foot of the rafters, just over the lower posts, and carefully attached to each rafter, the strips being tied end to end so that they reached around the building. Another course was laid on above this, overlapping it about a foot,

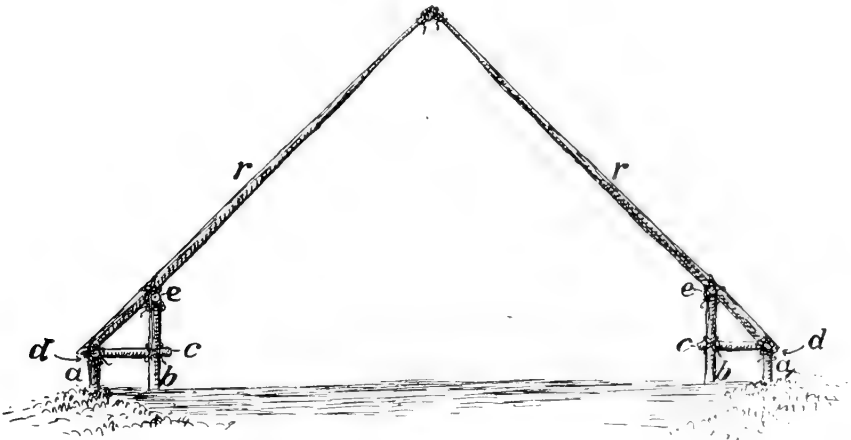


FIG. 10.—Cross section of Jamamadi Indian house. *a*, outer circle of posts; *b*, inner circle of posts; *c*, pole dividing the rooms; *d*, section of lower hoop; *e*, section of upper hoop; *r*, rafters.

and so on till the peak was reached. There were no doors or windows, the spaces between the posts of the outer circle and below the lower layer of thatch serving for entrance and light and air. The space between the outer and inner circles of posts was divided into rooms by tying a pole from each inner post at about breast high to the

top of an outer post opposite. This provided 25 cells or rooms about 12 feet square. The poles served for supporting the hammocks of the occupants. The whole building was most carefully made, even the vines used for holding it together being peeled and scraped (fig. 11).

The Jamamadí had left this great building on account of the pestilence, and had erected several sheds 14 feet square, with thatched roofs. These were entirely open at the sides and had platforms of split palm

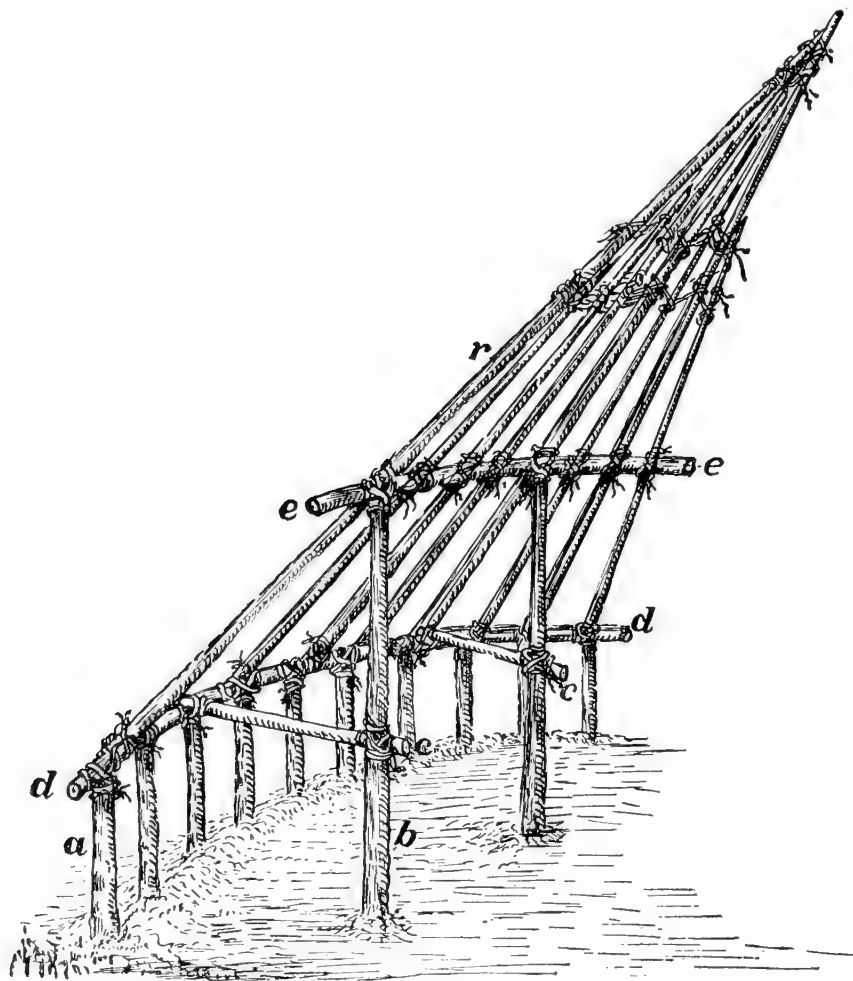


FIG. 11.—Detail of construction of Jamamadí Indian house. *a*, outer posts; *b*, inner posts; *c*, pole dividing the rooms; *d*, lower hoop; *e*, upper hoop; *r*, rafters.

wood raised 2 feet from the ground to serve as floors. These were much like the poorer dwellings of the Tapuios, and probably made in imitation of them.

The Jamamadí are agriculturists and hunters. Their method of cultivation is with fire. They cut the timber and burn the leaves and smaller brush during the dry season, thus clearing the surface of the soil, which they then plant among the logs and stumps. They get about two crops and then allow the land to grow up to forest again.

The first civilized men to visit them say they were then girdling the trees with stone axes by pounding off the bark. Afterwards these were burned down by piling logs against them. They now have a few steel axes which they have procured from the rubber gatherers.

They raise corn and manihot, pineapples, bananas, and plantains, the pupunya palm, tobacco, sugar cane, and a few other plants. Their corn is quite distinct from that cultivated by the Tapuios, being much taller and having a softer grain. They were found parching the ripe corn for food. They cultivate both species of manihot, but the more ordinary one seems to be the nonpoisonous, called maka-shē'ra. This is cooked like potatoes, and a flour is also made from it, which is baked into cakes (beju). In pressing the juice from the manihot they employ the "tipi-ti," a long tube of woven rattan, common among the Tapuios for the same purpose. (Plate 7, fig. 1.) The only use I saw them make of the sugar cane was to chew it to get the sweet juice. The fruits of the pupunya palm are eaten and the old wood is made into bows.

They are great hunters, the weapons being the blowgun and poisoned arrows, and the bow and arrows. (Plate 6, figs. 3, 5, 6, 7, etc.) The blowgun is a carefully made weapon of heavy wood, 10 or 12 feet long, round and tapering, and covered with rattan. It is in every respect like those of the tribes on the Peruvian Amazon. The arrows are needle-like splinters of palm wood. The quiver is of palm leaf carried by a string around the neck. A small calabash with a hole in one side is also hung from the neck. (See Plate 6, fig. 13.) In this is carried the tree cotton for wrapping the end of the arrow to make it fit the bore of the gun. The poison, unlike that of the upper Amazon, is fluid, and is heated until it foams, when the points of the arrows are dipped into it and passed through the fire to dry. The poison is said to be made only by the chiefs, who keep the formula secret. They also prepare a counter poison, which consists largely of salt, with which they cure animals slightly wounded which they wish to tame. They carry with them on the hunt a broad band of bark which is drawn about the body beneath the ribs; when they are going to shoot they draw this tightly around them. (Plate 6, fig. 2.) The blowgun is used for birds and monkeys and game in the trees. For game on the ground they use the bow and arrows. The bow is short and stiff and made of black palm wood, the arrows are long and heavy, the shafts of reed and the points of palm wood. They are said to sometimes poison these.

The Jamamadí use bark boats (fig. 12), made from a single piece (fig. 13), taken from a standing tree said to be the jutahý. The canoes are about 16 feet long and 3 feet wide, flat on the bottom, and the ends are drawn up and tied, thus forming hollow beaks. They are lashed and braced into shape and are then turned over the fire and heated

until they are dry and hard. They seem to be used as a means of conveyance up and down the river rather than as fishing boats. The paddles are long and pointed.

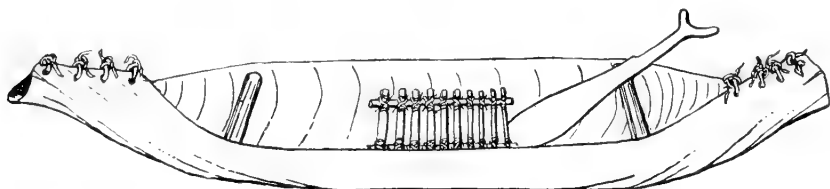


FIG. 12.—Bark canoe of Jamamadí Indians.

These Indians make earthen pots of fire clay for holding water and for cooking purposes. No ornamentation or painting was seen upon any of them. They were once noted for making fine bark hammocks,

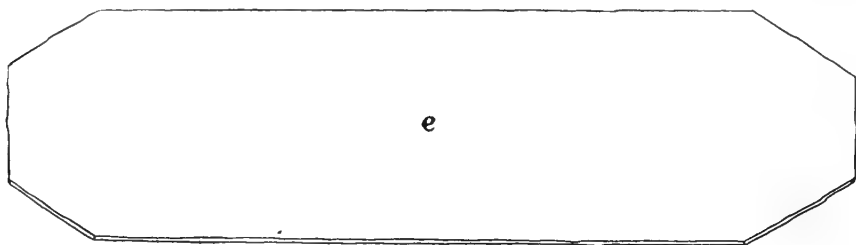


FIG. 13.—Strip of bark from which canoe is made. (See fig. 12.)

but they now prefer to trade tame monkeys to the rubber gatherers for cheap cotton hammocks from Pará. (Plate 7, fig 5.) During the season they collect a few nuts and a little sarsaparilla for trade with the settlers.

LIST OF WORDS OF JAMAMADÍ.

head: tā tī'	foot: tē'mě
hair: tāti'-kōnē'	thigh: fānākō'
forehead: nōkūbākō'	toes: nāmīdīnī'
eyes: nōkō'	ear: vā'rābō
face: ēbētē'	man: yā'rā
nose: wīdī'	woman: fānāwī'
upper lip: bōnō'	boy: māda hā' (n)
under lip: īfū'	baby: yāuīnī'
tongue: ēbēnē'	fish: ābā'
teeth: īnū'	dog: jūmāi'
chin: ēnēdē kōnē'—perhaps beard	tapir: āwī'
neck: nāmīdē'	tobacco: cīnā'
shoulder: kārōwī'	corn: kīmī'
arm: mānū'	sugar cane: cānā'
hand: yēlē dābō'	cotton: mōfū'
fingers: yēlē kāwī tārīnī'	pot: jīwāhā' (n)
finger nails: ātūrīnī'	boat: kānāwā'
breast: yūhārī'	paddle: kūyārī'
belly: dūrū'	blow gun: kārābōhā' (n)
leg: ī'sū'	belt for blow gun: kāmātā'

mortar for snuff: mōi mākī'
bone tube for snuff: maupā'
shell for snuff: wāhū'
snuff: aūrīnī'
tanga: sūū'
house: ūbē'
bow: dīdīsā'
string: madīnī'
sun: lūkātī'

moon: kāsīrī'
water: pā hā' (n)
fire: hīmānī'
one: ūhārīnī'
two: fāmīnī'
three: ūhārīnī' fāmīnī'
four: fāmīnī' fāmīnī'
ten: dāmīnī'

THE PAUMARI.

The Paumarī (Arauan family) are river Indians, strictly confined to the main stream of the Purús and the chains of lakes in immediate connection with it. They are said to have once inhabited the Purús to near its mouth, but appear to be limited at present to the territory between the Ituchý and the Rapids. They are unable to endure contact with the forms of civilization existing among the rude rubber gatherers of the river, and are rapidly diminishing in numbers. They exist in small communities of a few families each, every one of which has its own chief or headman, though this person seems to have no great authority over them. They belong to several clans or subtribes, of which the following names were given:

The Otter people: Sābou kā Pāumārī.
The Alligator people: Kāsīi kā Pāumārī.
The Vulture people: Mājūrī kā Pāumārī.
The Peccary people: Hīrārī kā Pāumārī.

They are a humble, cowardly people, living in deadly fear of the Hypurinás, their neighbors on the upper river. They are so childish and simple that they are easily imposed upon by the settlers on the river, and are persuaded to undertake long and exhausting labor at the paddle for a few drinks of rum, of which they are inordinately fond.

They love music and make Pan's pipes of reeds, and rude trumpets of earthenware. While they are pulling at the paddle they are continually singing (fig. 14). The following are translations of some of their boat songs:



FIG. 14.—Paumarī Indian canoe song.

1. My mother when I was little carried me with a strap on her back. But now I am a man and don't need my mother any more (fig. 14).
2. The toucan eats fruit in the edge of my garden and after he eats he sings.
3. The jaguar fought with me, and I am weary, I am weary.

The following they call the song of the turtle:

I wander, always wander, and when I get where I want to go I shall not stop, but still go on.

They pass much of their time along the river, roaming from one sand bar to another in search of food, but have more permanent villages on the lakes inland, which they occupy during the rainy season.

They are all marked with a peculiar skin disease which leaves large white spots on the hands and feet, and shows on the face and other parts of the body in dark, ashy blotches, which itch continually. One

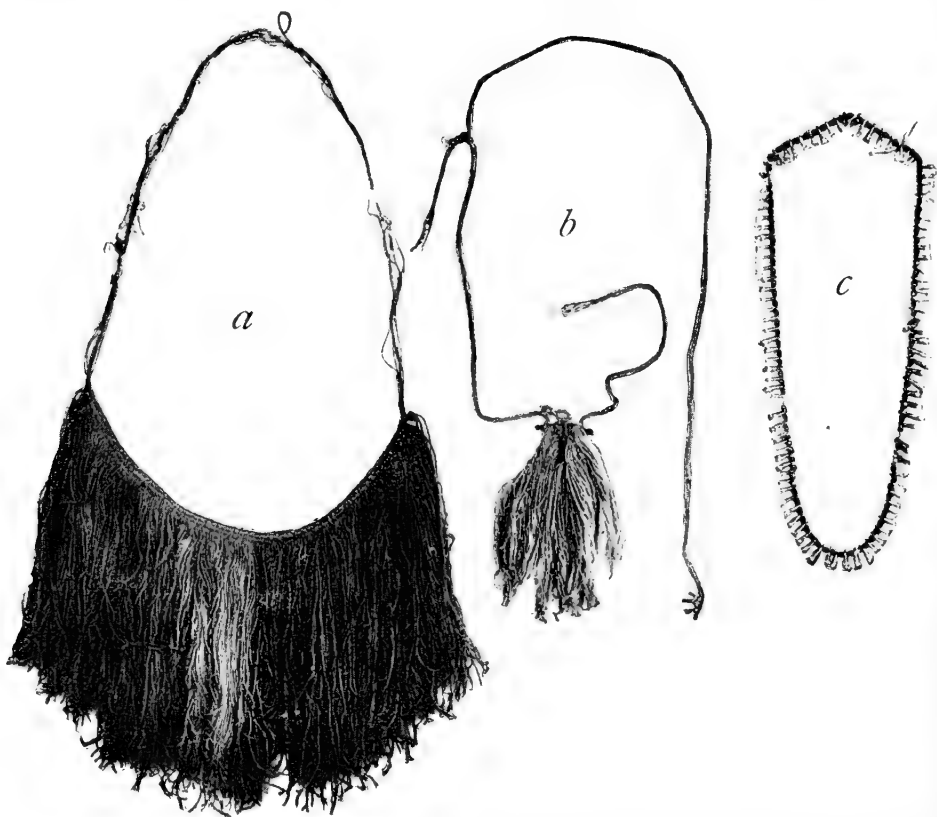


FIG. 15.—Clothing of Paumari Indians. *a*, woman's apron (tanga); *b*, man's apron (tanga); *c*, necklace of monkey's teeth.

old fellow, covered with this disease, was seen lying naked on a mat scraping himself with a clam shell. They make much greater use of paint than the other tribes of the Purús, covering their bodies and limbs with broad, horizontal, red stripes. Their paint is made by mixing annatto with balsam copaiba. The painting is done by dipping the ends of the fingers in the paint and drawing them around the body and limbs. The face may be entirely covered or painted in fanciful stripes. They go bareheaded and barefooted, and dress in the tanga, a little apron 2 by 4 inches in size, made of cotton threads and colored red with annatto (fig. 15). The aprons of the women are a little larger

(fig. 15). The hair is cut square across the forehead and allowed to hang down the neck. They pierce the lips and the septum of the nose, ordinarily wearing plugs of wood in the orifices, but are said to don tusks of wild animals on feast days. When they were given rum they carefully pressed in the plugs so as to lose none of the drink.

The average height of several men measured was 5 feet 2½ inches.

They with the other Purús tribes cultivate a little tobacco, which they only use as snuff. The green leaves are toasted over the fire and powdered in little mortars made of the case of the Brazil nut (Plate 8, fig. 3) and then mixed with ashes. The ashes from the hulls of the fruit of the chocolate bean are used for this purpose. They inhale the snuff through a pair of hollow bones of a bird's leg (Plate 8, fig. 1). These are fastened side by side with a braid of cotton thread, and the upper ends are rounded with beeswax to fit the nostrils. A quarter or half teaspoonful of snuff is placed in the palm of the hand or in a clam shell and drawn up with one or two long breaths. The snuff box is made of a river shell to which a neck formed of bone has been cemented (Plate 8, fig. 2). They are said to make a fermented drink from fruits, but this was not seen.

They pass much of their lives in their canoes; these are narrow dug-outs 12 or 14 feet in length, and sharp at both ends (Plate 9). Their paddles, instead of being round-bladed like those of the Tapuios, are long and narrow.

The great level sand bars along the river are made use of by them in towing their canoes on their voyages upstream. A Paumari would be frequently seen walking along the edge of the bar towing his canoe, holding his family and all his possessions, to new fishing grounds, his wife sitting in the stern with a steering paddle holding the canoe from the shore.

They live in little oven-shaped huts, so low that they have to get on their hands and knees to enter them. These are made of long, narrow palm-leaf mats, spread over a framework of sticks bent and stuck into the ground at both ends. The mats are carried in their canoes, so that they always have their houses with them. Their more permanent villages on the inland lakes are made of houses of the same kind.

When the water rises over the sand bars in the rainy season they move their villages upon large rafts anchored in the lakes. These rafts are made of logs of light timber on which a floor of strips of palm wood is tied with vines. On this they remain, rising and falling with the flood and its ebb until the dry season uncovers the sand bars again. They have a tradition accounting for this curious custom. Long ago the people of their tribe built their villages only on the land like the other tribes, but one year the flood rose to a much greater height than usual, covering the sand bars, and then the lowland, and finally the terra firma. The people climbed into the trees, and lived

for a time upon fruits and leaves, but finally all were drowned or died of hunger but two; these lived until the flood abated, when they descended and took possession of the earth again. These were the ancestors of the present tribe of the Paumari. At the beginning of the rainy season they built a raft and moved their hut upon it, that they might not be drowned with the flood, and their descendants have kept up the custom to this day.

They are said to bury their dead in a sitting posture, breaking up the weapons and personal possessions of the deceased and burying them with the body, and building a cover of the same character as their houses over the grave.

They live chiefly upon fish, turtles, and turtles' eggs. They are said to be so expert in catching turtles, that they can dive to the bottom of the river and take them there. They capture large numbers as they come out to the sand bars to lay their eggs and keep them alive for future use in pens made of stakes placed in the lakes near their villages.

They gather wild fruits and have small gardens. They keep a few dogs procured from the settlers, and some chickens which seem to accommodate themselves well to the wandering lives of their owners. They make a small amount of india rubber to trade with the settlers, and collect a little balsam copaiba, and in the season, make oil from turtles' eggs. This is the famed turtle butter (*manteiga de tartaruga*) which is an article of commerce and made use of by the civilized Brazilians in cooking. They collect the eggs from the sand bars, using a sharp stick to find the deposits and their paddles as spades to dig them out. A canoe is filled half full of eggs and the owners get in and dance upon them with their bare feet. When all the eggs are crushed the oil rises to the surface and is skimmed off into pots.

Their pottery is rude and unpainted, and the mats used in covering or flooring their houses are usually without colors or figures.

LIST OF WORDS OF THE PAUMARI.

head: dādī'	shoulder: mântōsī'
hair: dādī' kāfō'nī	arm: wādī'
forehead: ātai'	hand: sã ai' kai dā'nī (upper side)
face: nōkū'ī	hand: sã ai' kābōdīnī (under side)
ears: mōrōbū'ī	finger: sãai'
eyes: nōkū'ī bādā'nī	finger nail: sãai' kãnā kōdī'nī
nose: wīrīdī'	heart: wāi
mouth: bōdī'	blood: āmā'
lip: ī hī'	skin: āsā fīnī'
tongue: ā bā'nī	thigh: kābāhai'ī
teeth: Inū'ī	leg: ā wai'ī
chin: kãnādai'ī	foot: dāmāi'
beard: nādaū' kũ sauīnī'	big toe: dāmāi' nōkū'nī
neck: nābīdī'	toe nail: dāmāi' kãnā kōdī'nī
breast: mākōmī'	devil: baiadi'

man: mākē'rā
 woman: gāmō'
 girl: gāmō' pāisī'
 boy: mākē'rā pāisī'
 father: bū'
 mother: mīā'
 son: kō'dī sāi' (my son)
 brother: kō'dī kái ū' (my brother)
 chief: kái'dī tūshāu'ā (my chief)?
 dog: jūmāhī' jaguar—jūmāhī'
 tapir: dā'mā
 fish: ābāhīsā'nā
 bird: īgītā'
 feather: bibī'
 snake: mākā'
 turtle: sīrī'
 egg: bānāfā'
 deer: ōtāirī'
 duck: wādāmā'
 parrot: wīlū'
 toucan: jākwā kwā'
 tree: āwā'
 leaf: āfānī'
 root: āwā' dāmā'nī
 fruit: āwā' bōnō'nī
 tobacco: ājiri'
 banana: sīpātī'
 corn: jār wā'
 cotton: wāgānī'nī
 mandioca: bōdā'
 rubber: sīrigā'
 chocolate bean: kānākā'
 cacao tree: kānākā' āwā'nī
 stone: jādī'
 sand: kāsī'
 bow: kōdā hī'(n)
 arrow: ābī hā'(n)
 cord: ātū'(n)
 blow gum: kārābōhā'(n)
 spear: jūmīdī'
 knife: ādū'
 cup: wōū'
 pot: sīā hā'(n)
 canoe: kāmā'wā
 paddle: wānāmī'
 cloth: mākārī'
 hammock: sī hū'nā
 house: gūrā'
 roof: kūtīhī'(n)
 mat: kāwāsī'
 water: pā(n)hā'(n)
 river: wāi nī'
 lake: dākū'
 rain: bū hī'

current: jūrā'nī
 sun: sāi'nī
 moon: māsīkū'
 stars: bōrī'
 night: jūmā'
 fire: sī hū'(n)
 smoke: kāū jī'nī
 ashes: kāū fū'nī
 large: kārāhō'
 small: p ī sī'
 cold: kā fūi'
 hot: kā fō'nī
 good: jāhāmā'nī
 bad: jāhārī'
 sweet: chīnākī'
 sour: chīkātākī'
 bitter: ārāpākī'
 sick: kāwāmūnīkī'
 lame: tōnōrōhī'
 blind: sākāwānī'
 asleep: wādī'
 fat: bāsīnā'
 distant: nāpai'
 near: mā'kāri
 wet: abākī'
 dry: yānāfōrā'
 dead: ābīnī'

VERBS

to kill: īnābīnī'
 to cook: īsādōmāhā'
 to eat: īhā'
 to drink: īāwī'
 to fish: nābādā'
 to hunt: kārābōhā'(n)
 to run: kīdārāhāi'
 to cry: āsārā'
 to laugh: ōhā'nī
 to talk: wārīwārī'
 to sing: a hī'(n)
 to sleep: wādī'
 to stand: gā'
 to work: mārīnī'
 to smoke: kāsīsī'
 to sit: āwītī'
 one: wārānā'
 two: bāmīkī'
 three: āwbāārā bākōsīkī'
 four: ākū bāmāhā kāmākī'
 five: sāai-kā whārānī' (once the fingers)
 six: sāai kā whārīhā'
 part: pītānī'
 many: īpōikī'
 I: ōwā'nī

thou: iwā'nī

the: iōnyā'

no: nyā'

yes: yā'

to-day: idākābai'

to-morrow: āfūi kaiūmā'

yesterday: idānija'

COMPARISON OF ADJECTIVES

sweet: chināki'

very sweet: chinākā'wāki'

sour: chikātāki'

very sour: chikātākā'wāki'

bitter: ārapāki'

very bitter, poison: ārapākā'wāki'

SENTENCES FROM THE PAUMARI.

1. I am going with you: kādānyā' ōkākihō'
2. I am going to fish—I wish to go fishing: bāhāmā' ōkābūrū' kibānāhō'
3. I am going hunting—I wish to hunt: ōkārabōā'(n) kibānāhō'
4. Yesterday I went hunting: idānija' ōkārabōājā'
5. To-morrow I go hunting: āfōkaimā' ōkārabōā'n kiānā' kibānāhō'
6. I am going to sleep—I wish to sleep: ōwādī' kibānāhō'
7. I did not sleep last night: hidānija' jūmā' wādīrihī'
8. Let us go to sleep: yābānā' āwādīā'wā
9. Yesterday I killed a deer: hidānija' ōnābīnī' hōtāiri'
10. The night is very dark: jūmā' bāki bāki'
11. I have two brothers: hidāhō' jāmānī' ā'jū bāmiki'?
12. My father is dead: bīi' ābīnī' hidākābai' wānī' kābīiri' kābai' ōhō' jākīhō'.?—
13. My mother is dead: miā' hidākābai' ābīnī'
14. I am sick: ōkōwāmū'nī' kihō'
15. Yesterday I was sick a little: hidānija' whārihā' ōkōwāmūnī' paīsi
16. I go to take a bath—I wish to bathe: ōkānāhā' kibānāhō'
17. I am very warm this evening: āfāki' jūmā' wānikwā'
18. The river has many fish: hīhīdā' wāmī' kābāki'
19. The river runs much: wāinī jōrāki' kwānā' wānāmīnī' jāhāriki'
20. The deer runs fast: nāhīnā' tihīdā' ōtāiri' bīnāki' dārāhā'(n) dānōki'
21. I have a good canoe: kānāwā' kājāhāki' kōdīānyā' hōjāirā'
22. My canoe is old: kānā'wā bōdā'
23. My canoe is new: kōdī kānā'wā jādī'nī
24. I am sick to-day: hidākābai' i ōkōwāmū'nī
25. I shall be sick to-morrow perhaps: hidākābai' i wābīnī' iōkaimā' ōkōwā-mū'nī??
26. My brother is sick: kōdī ājō kōwāmū'nī kiādā' hidākābai' i
27. My brother will be sick to-morrow perhaps: hidānija' wāhā'bīnī kōwāmū'nī ā'jō
28. My brother was sick yesterday: kōdī ā'jō kōwāmū'nī hidākābai' bīwā hōjā'-wīnī?
29. My brothers are sick to-day: ā'jū kōwāmū'nī dākābai'?
30. My brothers were sick yesterday: hidānija' wīgāmī'nī kōwāmū'nī
31. My brothers will be sick to-morrow: iōkaimā wīgāmī'nī kōwāmū'nī wā'bīnī

PAUMARI SONGS.

toucan my sing eat sings.

1. Jākwākwā' kōdī' sīrūi āhiāi' bihākī' āhī'.

The toucan eats fruit in the edge of my garden, and after he eats he sings

2. Miā ōni jānā rihī āi' sātī māhā wājāmā' rihī miā āi' sātī', māhā wājāmā' ōrā
ijā tīrihī'

My mother carried me when I was young, with a strap on her back, with a strap she carried me on her back but now I am a man and I do not need her any more

3. Jūmahī' wīā hārī bānī hīdā āwā kodī kōjā hārī kākā bārūhū hīdā'

I did not call the onca (jaguar) to my house, but my good drink called him

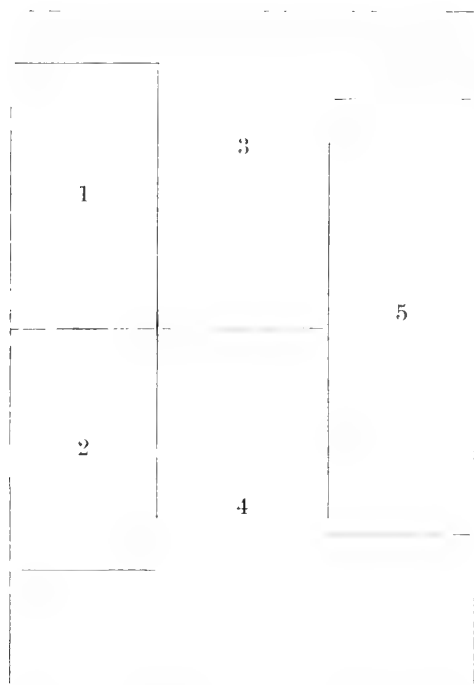
4. Hārī āi' bānāhō wājūi yānāhī āi' sātī māhā kōjā hārīā āwā kā tīrihī'

Good-by; you will give me nothing more; I am going

5. Miā āi' hō bāsūri kā pāmwarī' hī kāmīā ōhō jāi

O, my mother I am living among the porpoise people (that is people colored like the porpoise-white people)

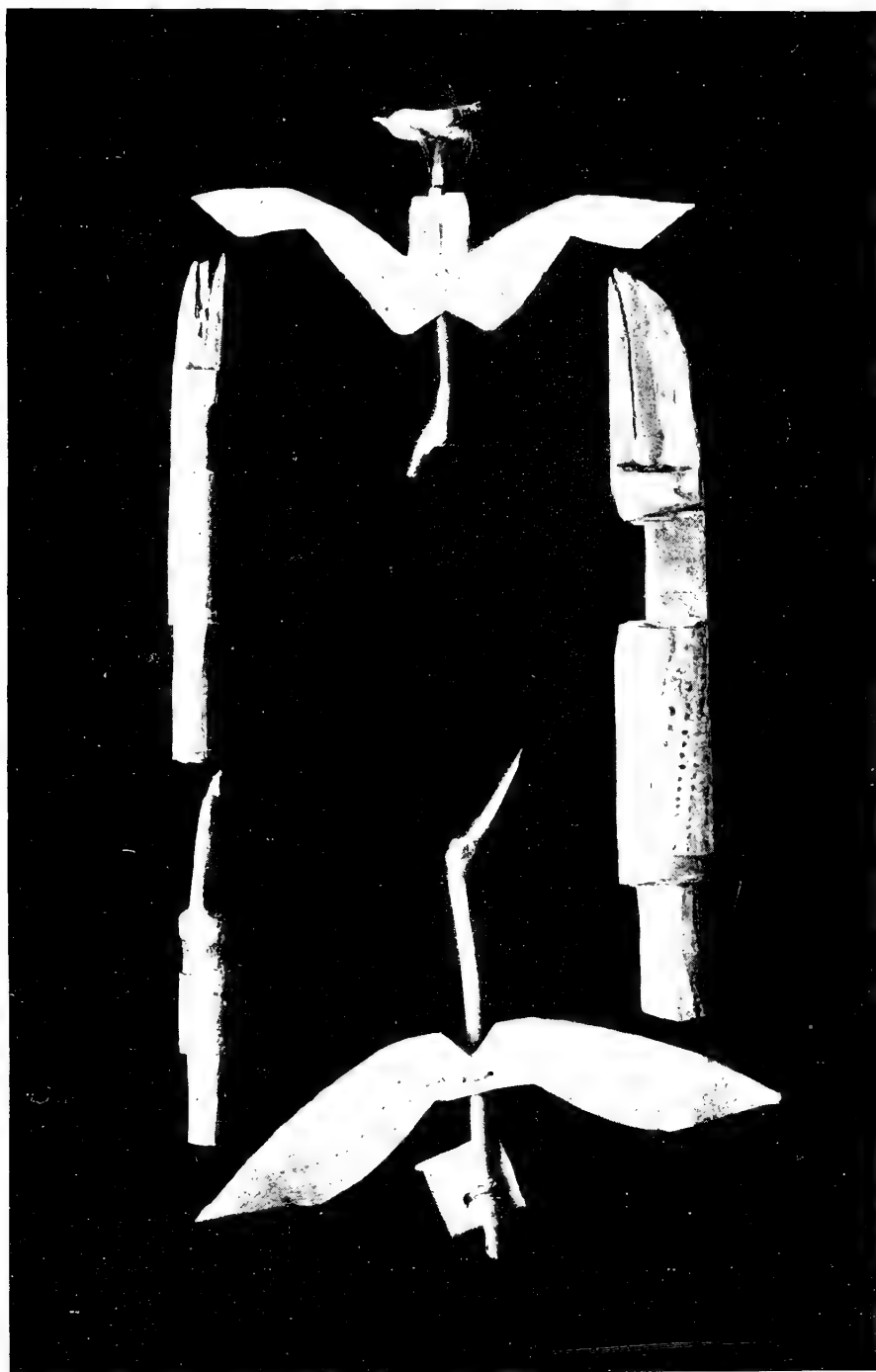
EXPLANATION OF PLATE 1.



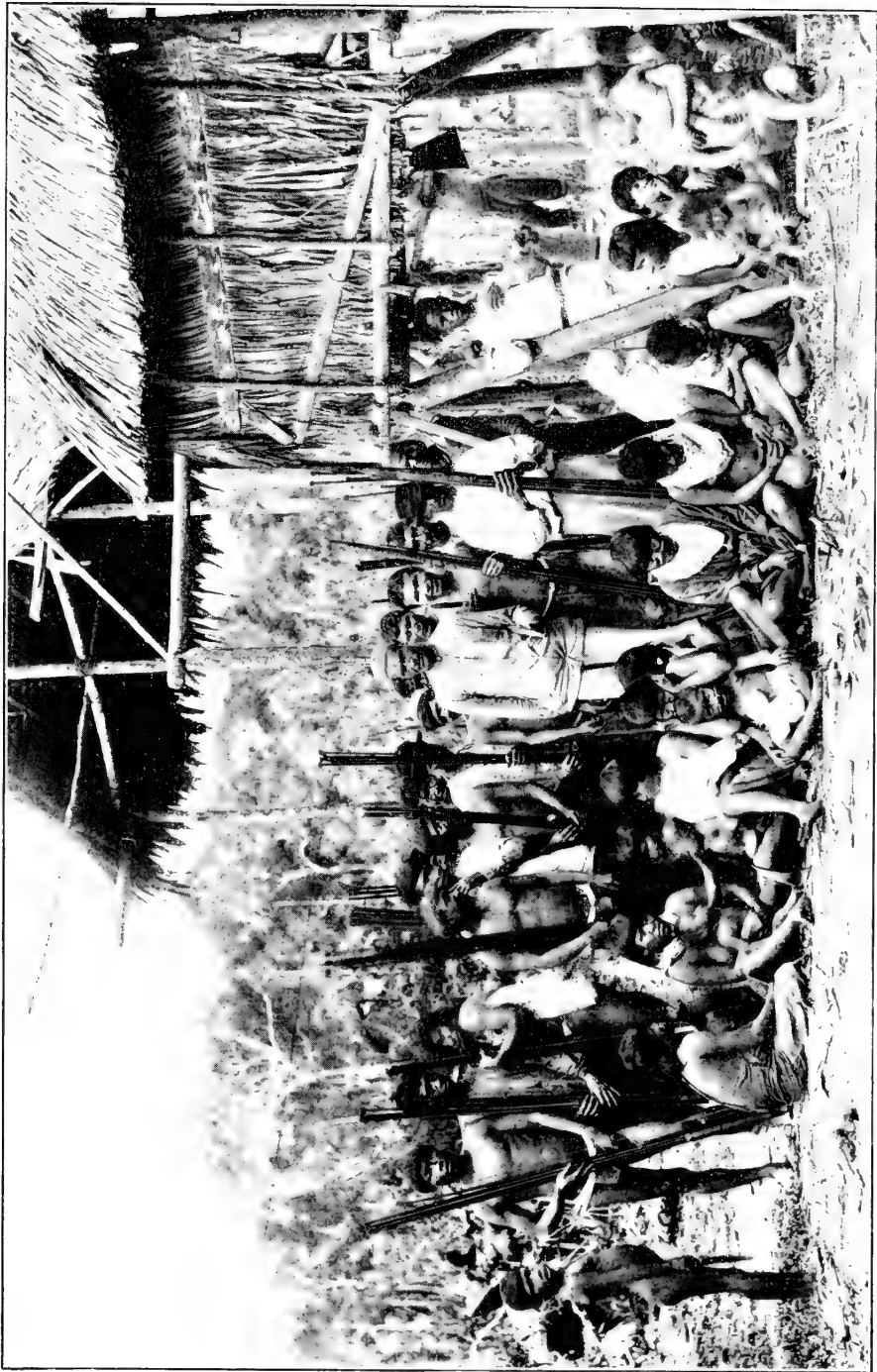
WOODEN BIRD FIGURES OF HYPURINA INDIANS.

Figs. 1, 2, and 5. TOUCANS.

Figs. 3 and 4. GULLS.



WOODEN BIRD FIGURES OF HYACINTH INDIANS.

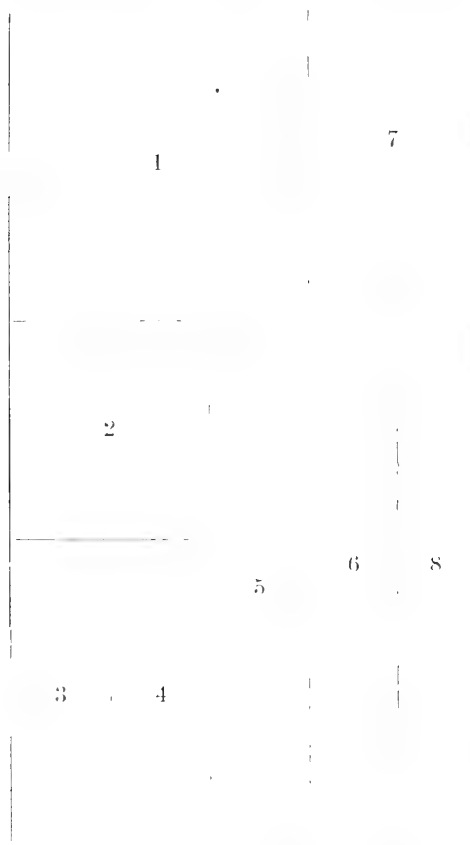


GROUP OF JAMAMADI INDIANS.



GROUP OF JAMAMADI INDIANS.

EXPLANATION OF PLATE 4.



ORNAMENTS OF JAMAMADI INDIANS.

Fig. 1. CROWN OF TOUCAN FEATHERS.

Fig. 2. CHIEF'S CORONET OF TOUCAN FEATHERS.

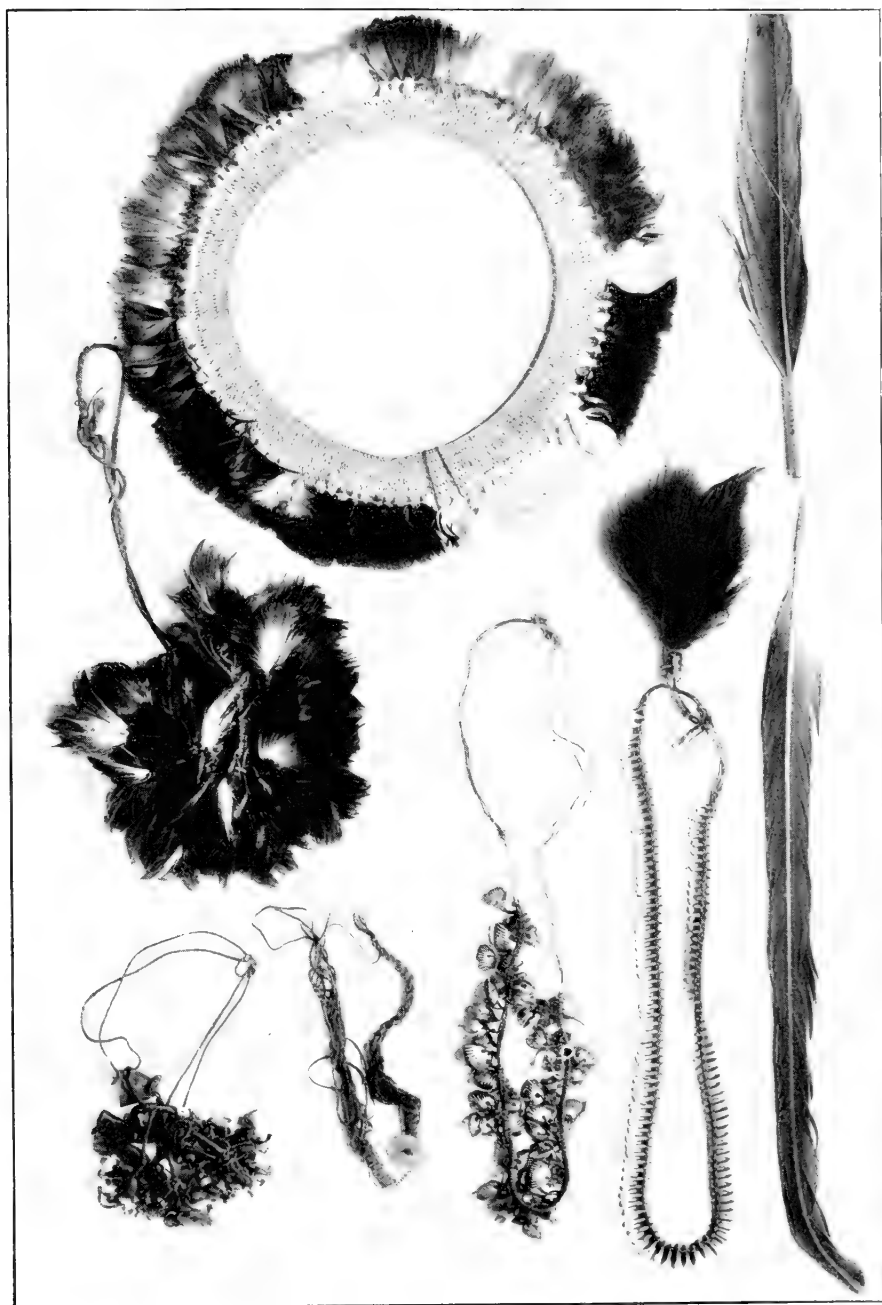
Fig. 3. GIRDLE ORNAMENT OF TAPIR'S HOOFS.

Fig. 4. PEARL DISKS FOR THE EARS.

Fig. 5. CHILD'S GIRDLE OF RIVER SHELLS.

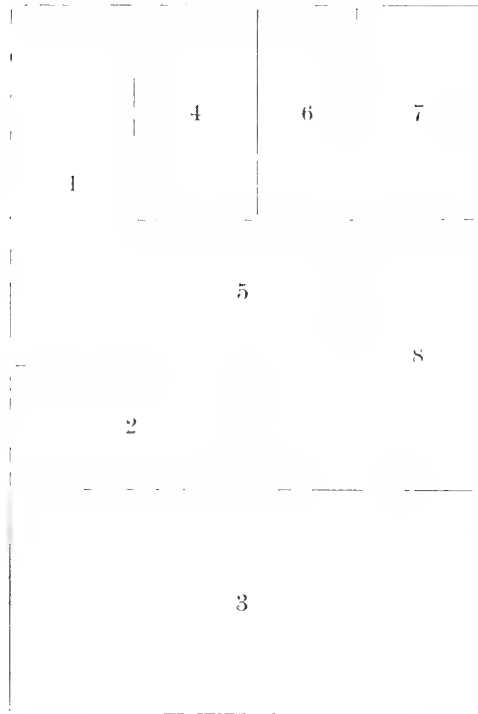
Fig. 6. NECKLACE OF MONKEY TEETH WITH TASSEL OF TOUCAN FEATHERS.

Figs. 7 and 8. MACAW FEATHER NOSE ORNAMENT.



ORNAMENTS OF JAMAMADI INDIANS.

EXPLANATION OF PLATE 5.



OBJECTS USED BY JAMAMADI INDIANS IN SNUFF MAKING, SNUFFING, AND COOKING.

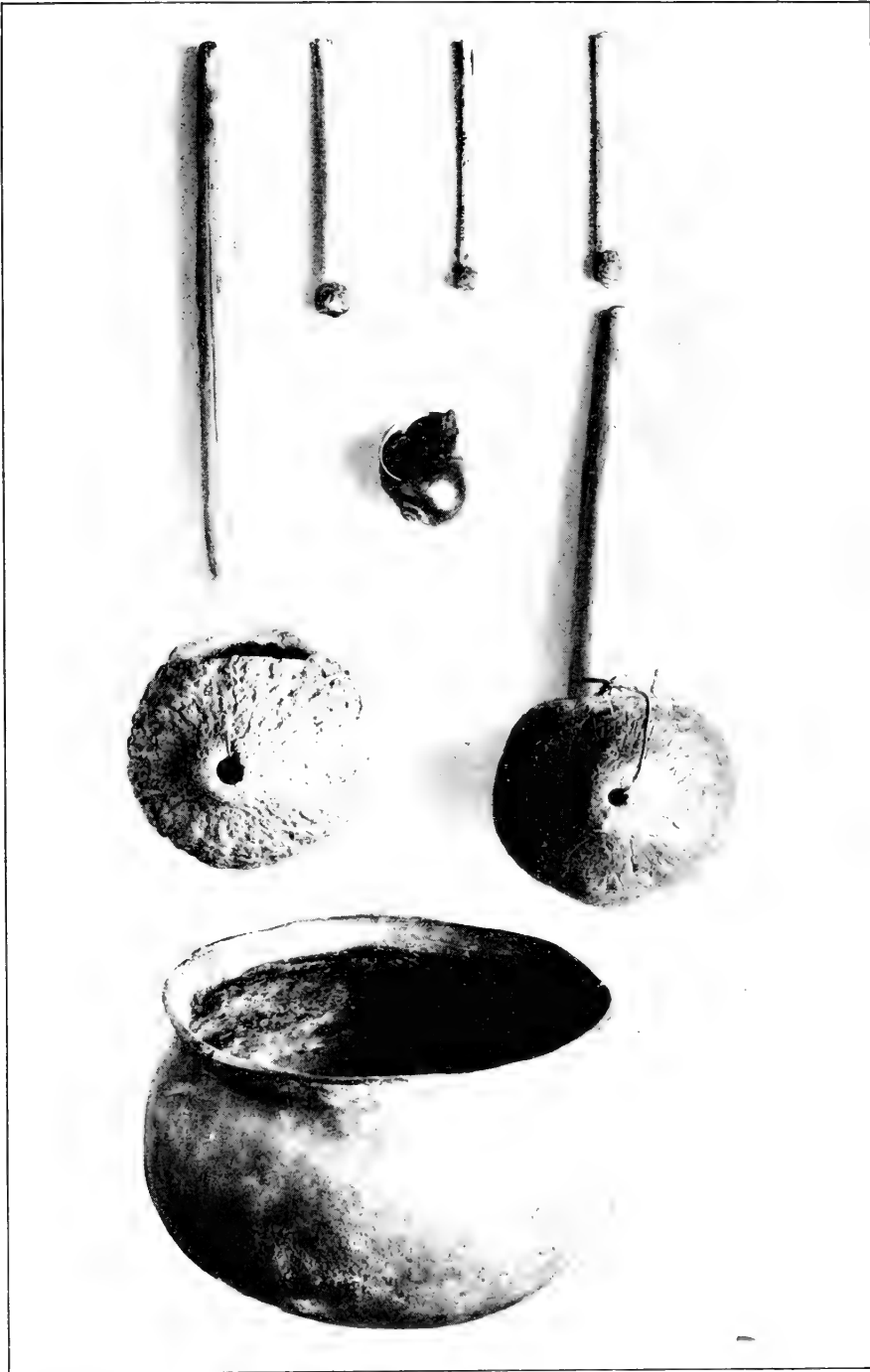
Figs. 1, 2. PESTLE AND MORTAR (Hypurina).

Fig. 3. CLAY POT FOR COOKING.

Figs. 4, 6, and 7. BONE TUBES FOR SNUFFING.

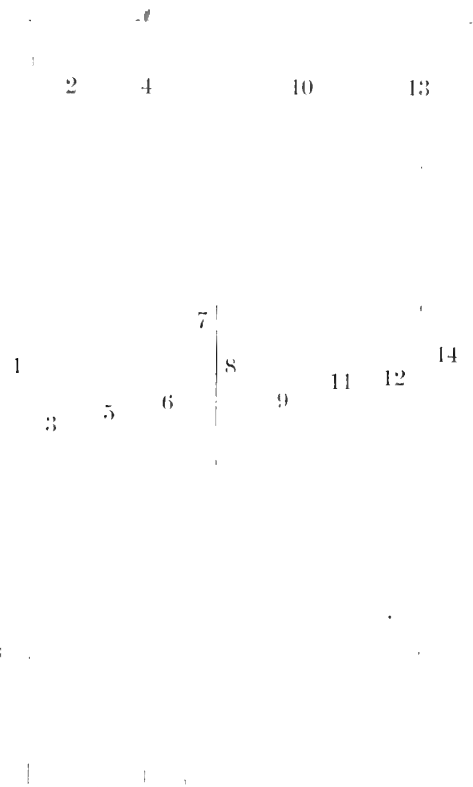
Fig. 5. SHELL SNUFFBOX.

Fig. 8. PESTLE AND MORTAR USED IN SNUFF MAKING.



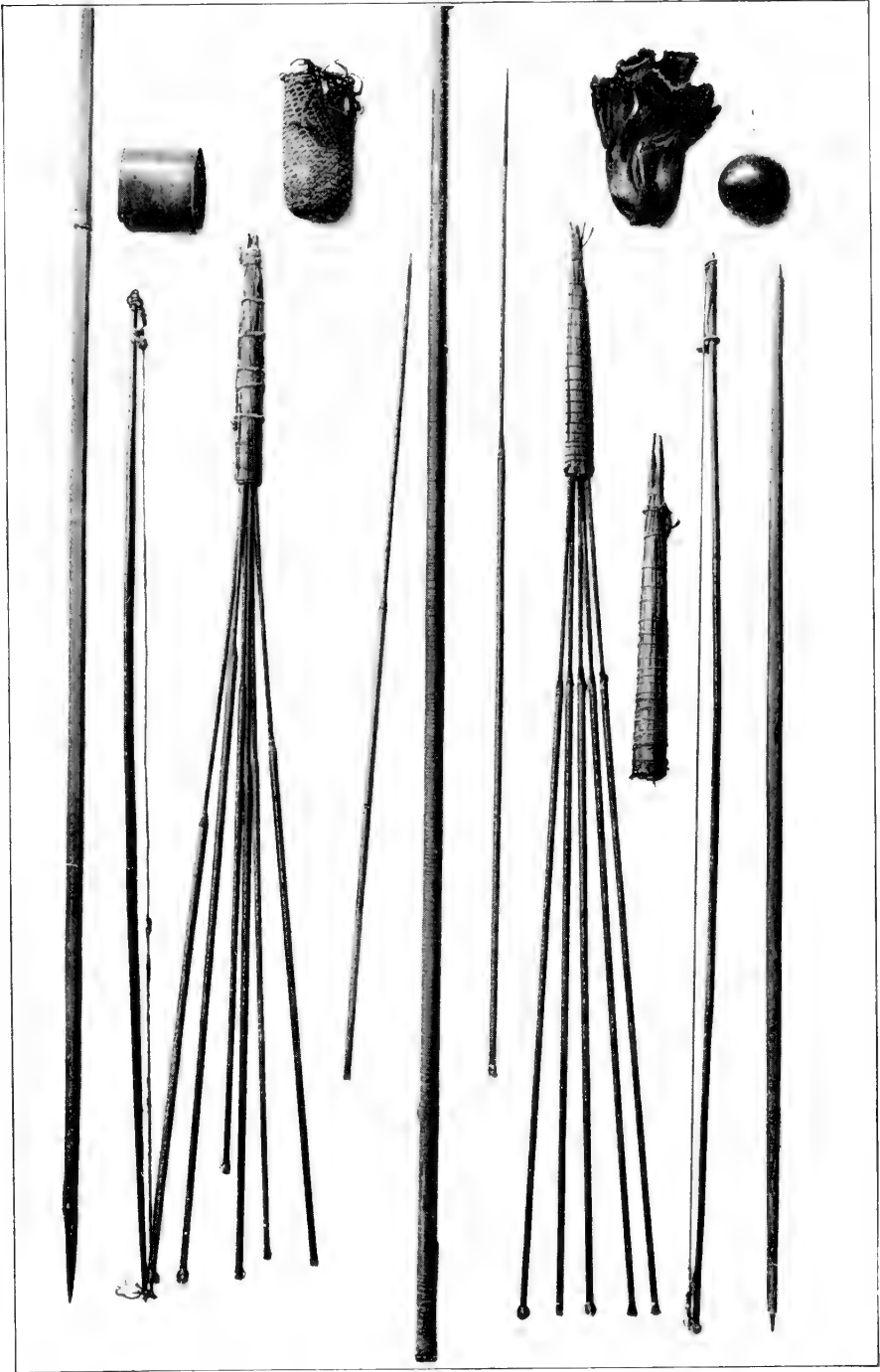
OBJECTS USED BY JAMAMADI INDIANS IN SNUFF MAKING, SNUFFING, AND COOKING.

EXPLANATION OF PLATE 6.



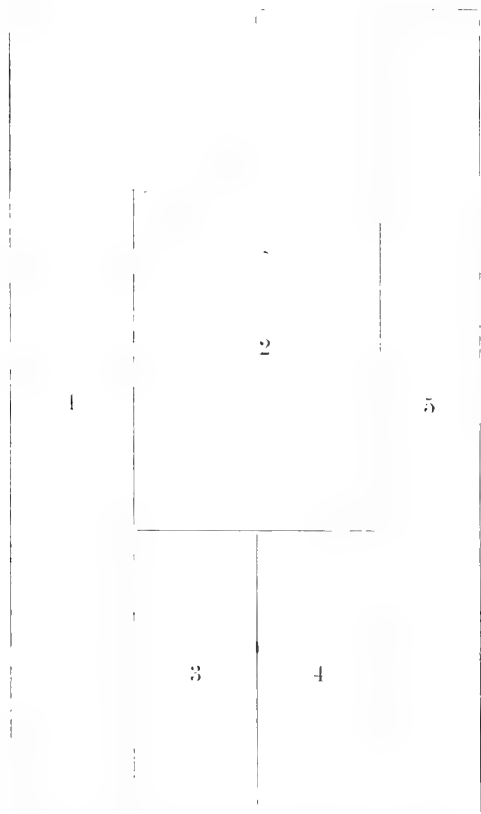
ARMS, ETC., OF THE JAMAMADI INDIANS.

- Fig. 1. WOODEN LANCE.
- Fig. 2. BARK BAND WORN WHILE SHOOTING WITH THE BLOWGUN.
- Fig. 3. BOW.
- Fig. 4. WOMAN'S BARK BASKET.
- Figs. 5 and 9. ARROWS IN LEAF QUIVER.
- Figs. 6 and 8. SINGLE ARROWS.
- Fig. 7. BLOWGUN.
- Fig. 10. BARK BAG.
- Fig. 11. QUIVER OF POISONED BLOWGUN ARROWS.
- Fig. 12. BOW.
- Fig. 13. CALABASH FOR HOLDING TREE COTTON.
- Fig. 14. BOW.



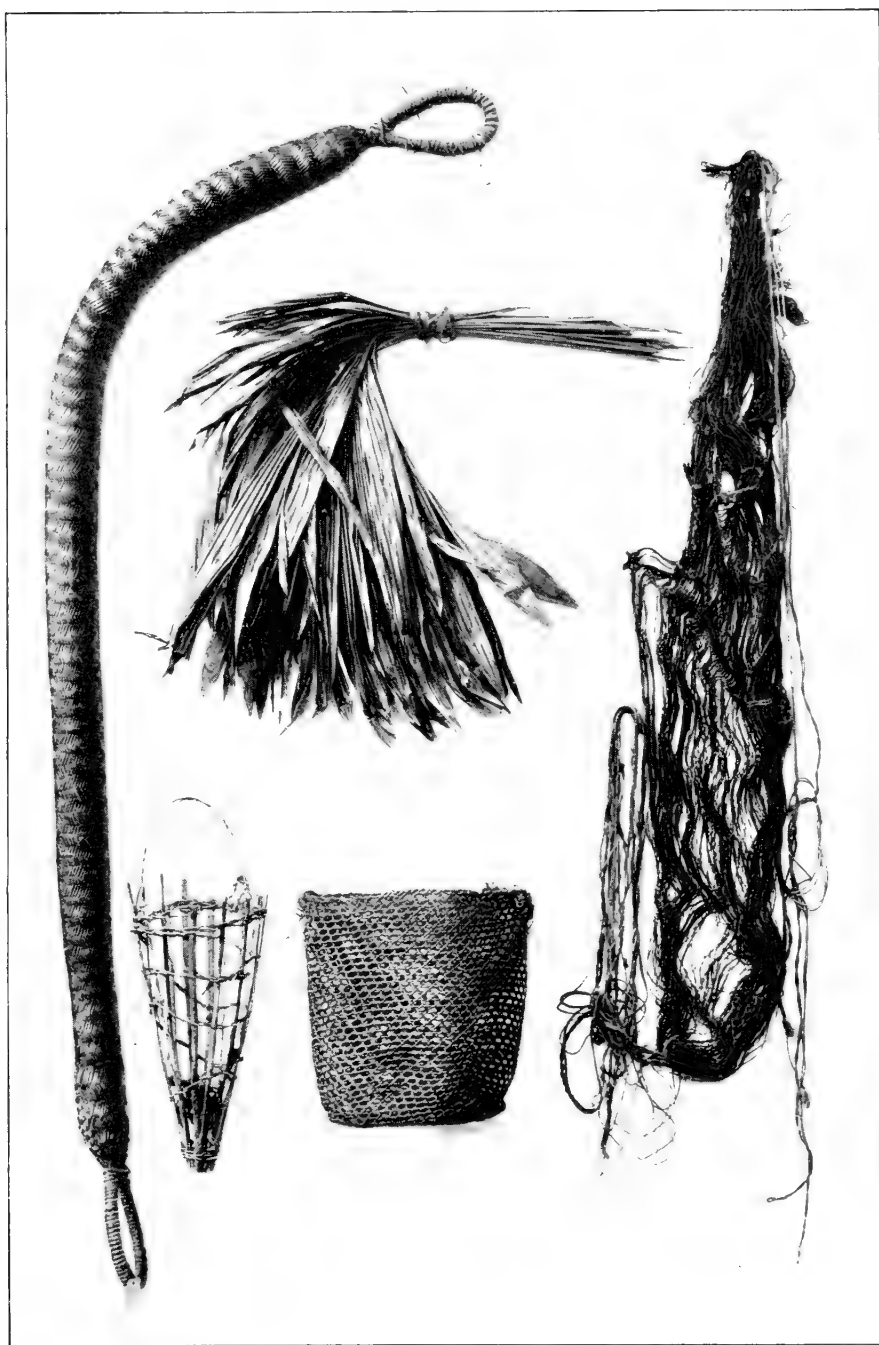
ARMS, ETC., OF JAMAMADI INDIANS.

EXPLANATION OF PLATE 7.



OBJECTS OF DOMESTIC USE OF JAMAMADI INDIANS

- Fig. 1. CASSAVA PRESS, *tipiti*.
Fig. 2. BUNDLE OF LEAVES OF THE CARANAÍ PALM USED FOR HATCHING.
Fig. 3. FISH NET USED WITH THE TRAP DESCRIBED IN THE TEXT.
Fig. 4. CARRYING BASKET.
Fig. 5. BARK HAMMOCK.



OBJECTS OF DOMESTIC USE OF JAMAMADI INDIANS.

EXPLANATION OF PLATE 8.

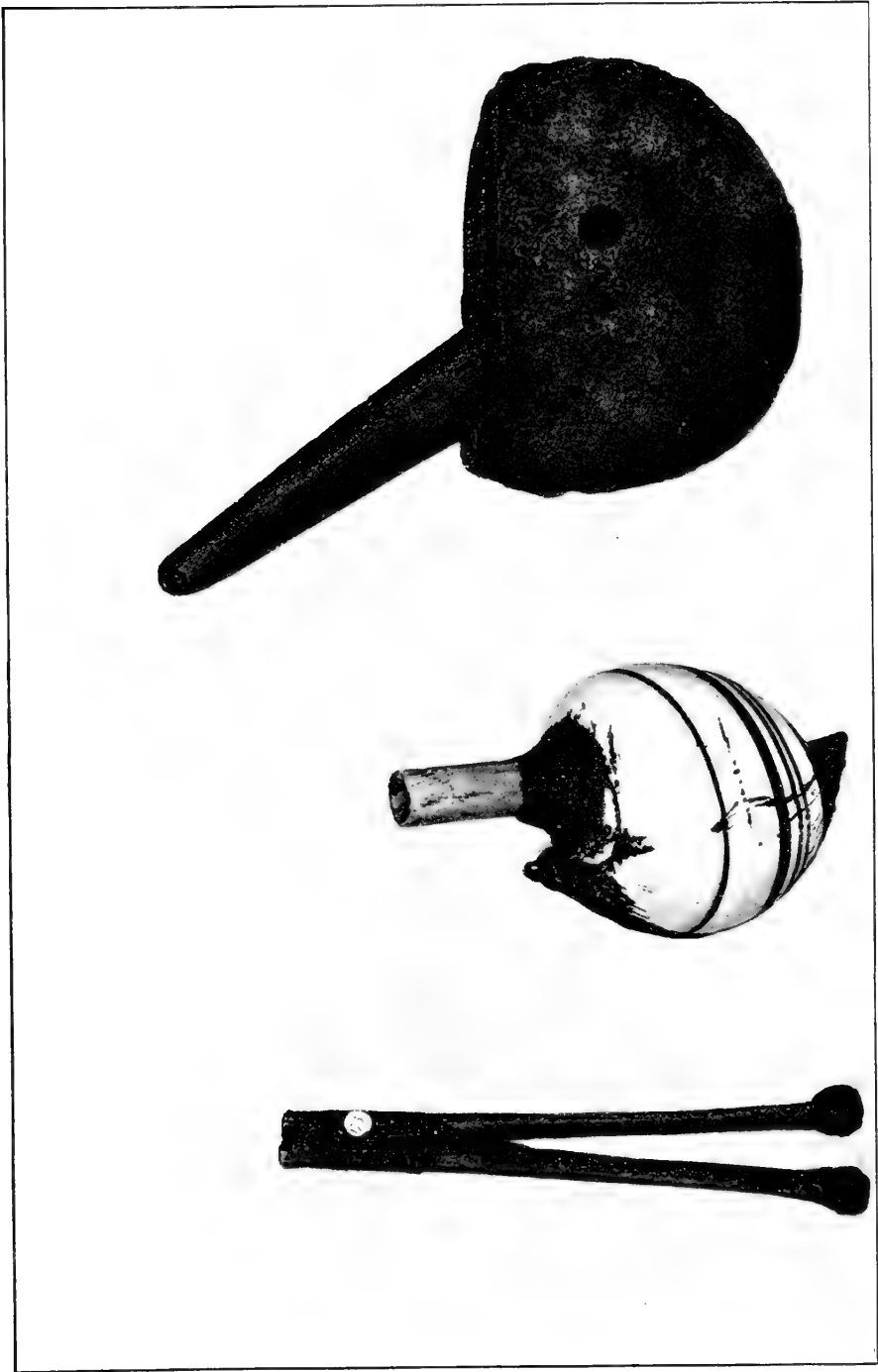


IMPLEMENTS USED IN SNUFF MAKING AND SNUFFING BY THE PAUMARI INDIANS.

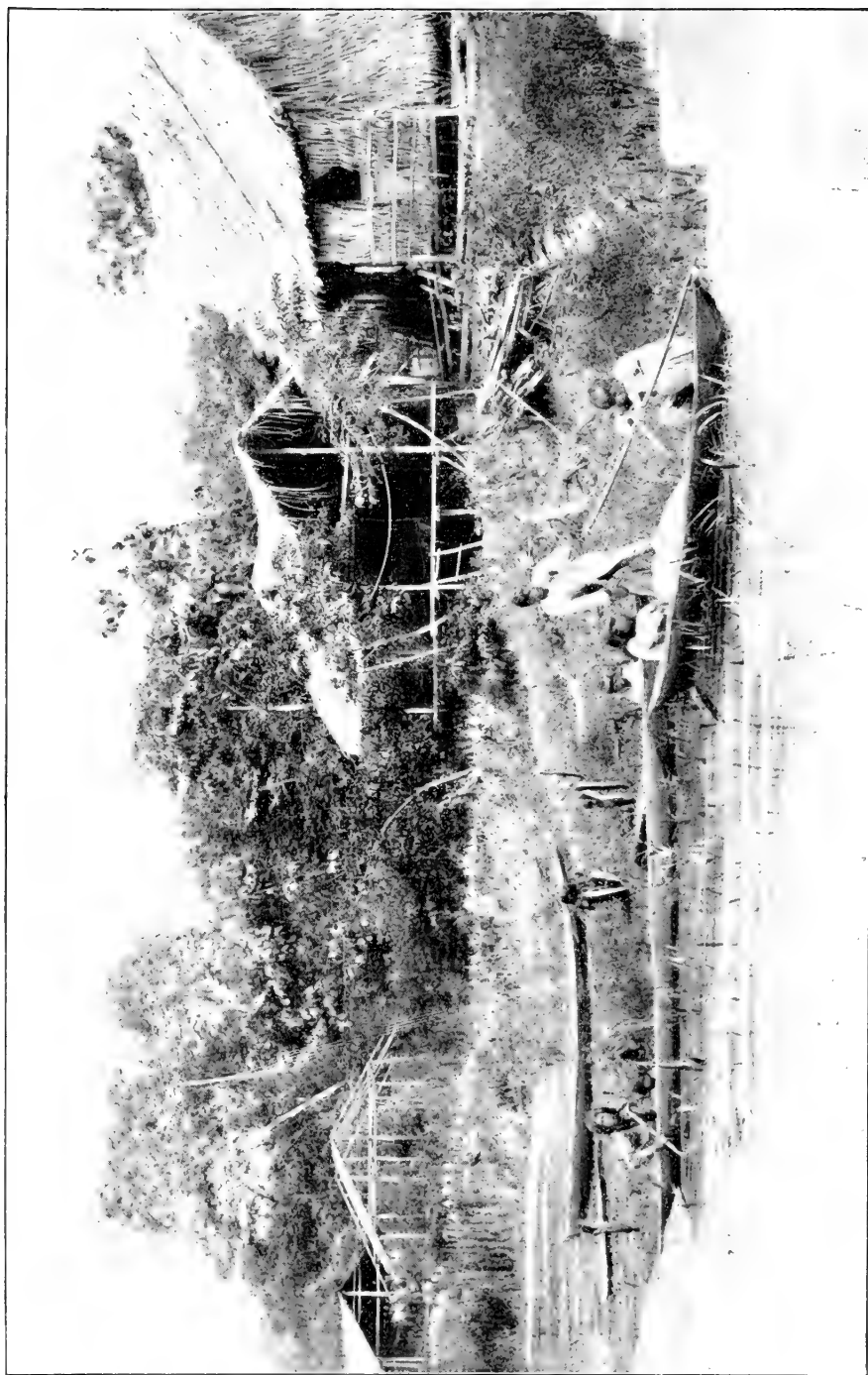
Fig. 1. DOUBLE BONE NOSE TUBE FOR TAKING SNUFF.

Fig. 2. SHELL SNUFFBOX.

Fig. 3. MORTAR AND CASE OF BRAZILNUT AND PESTLE FOR MAKING SNUFF.



IMPLEMENTS USED IN SNUFF MAKING AND SNUFFING BY THE PAUMARI INDIANS.



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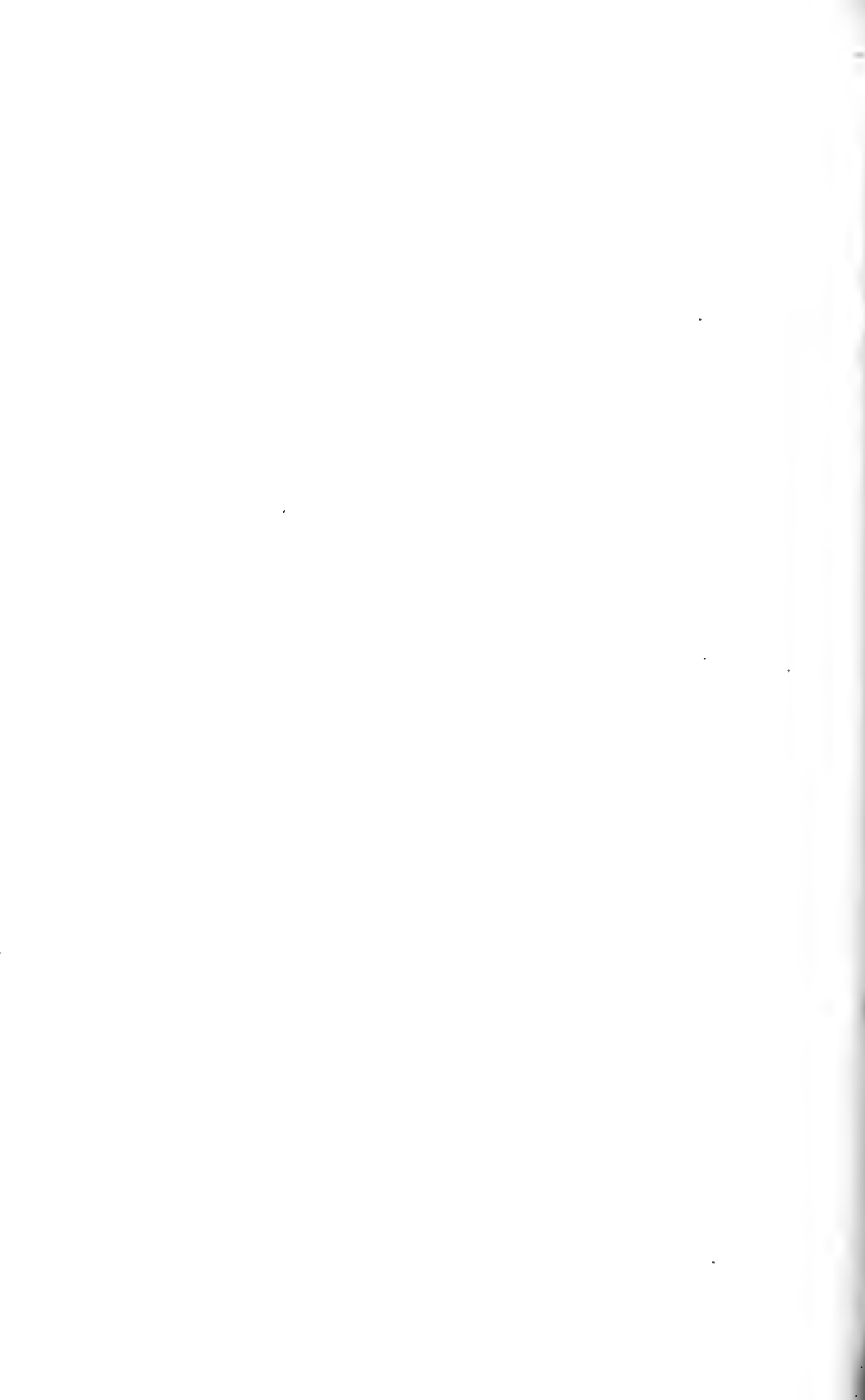
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